Vol. I FEBRUARY, 1920 No. 11

THE PAPER INDUSTRY

The Monthly Educational Journal of the Paper Industry.

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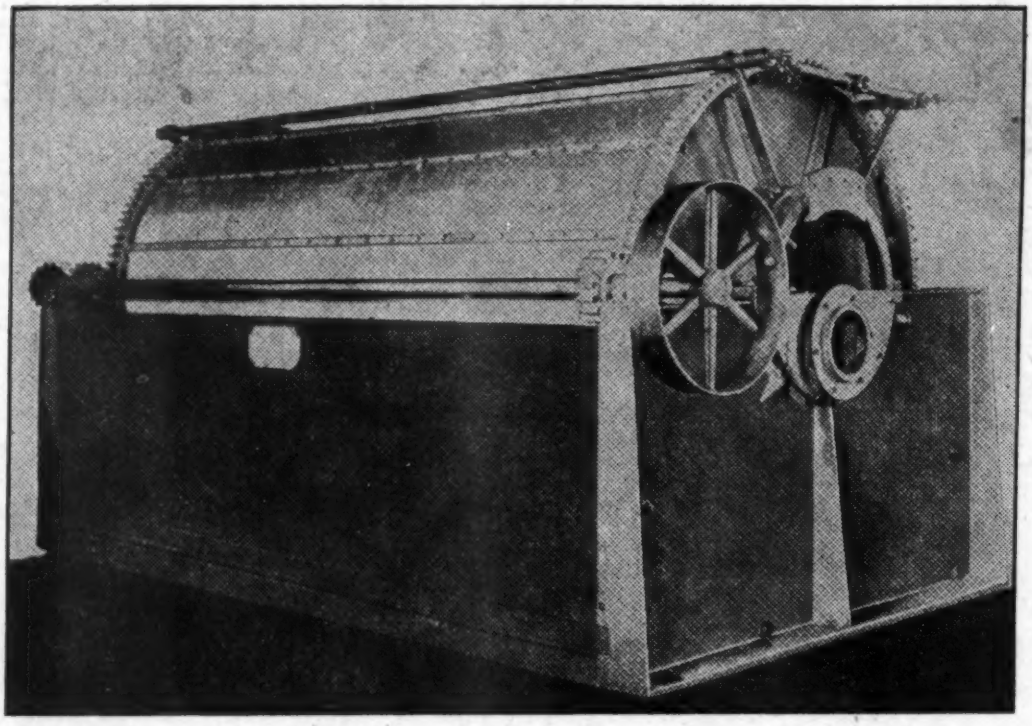

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Vol. 1—No. 11

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of The Paper Industry

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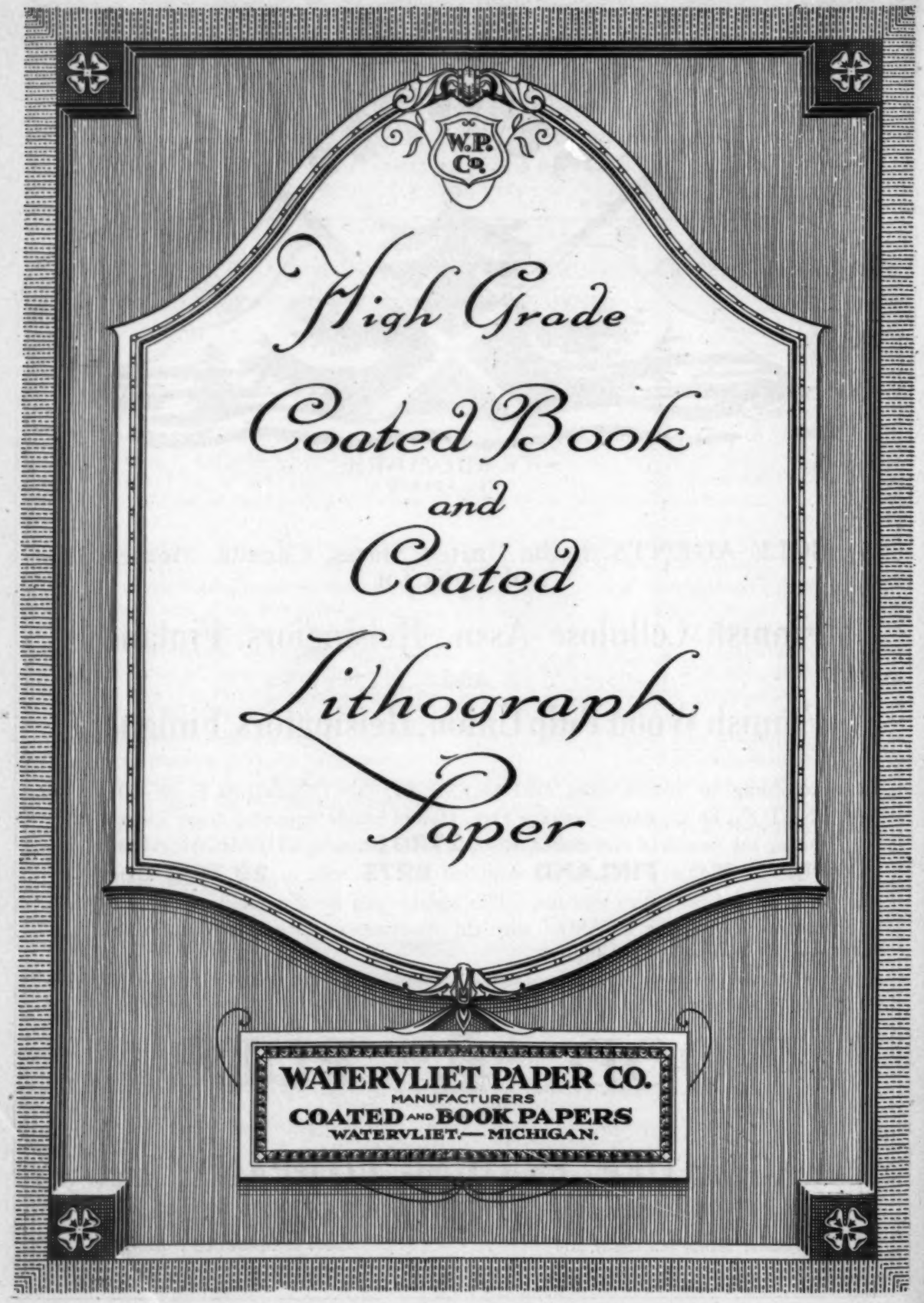
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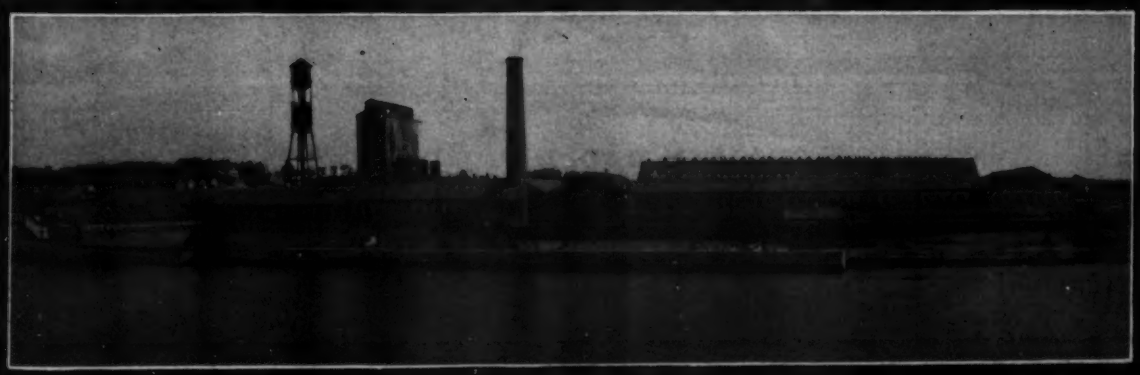

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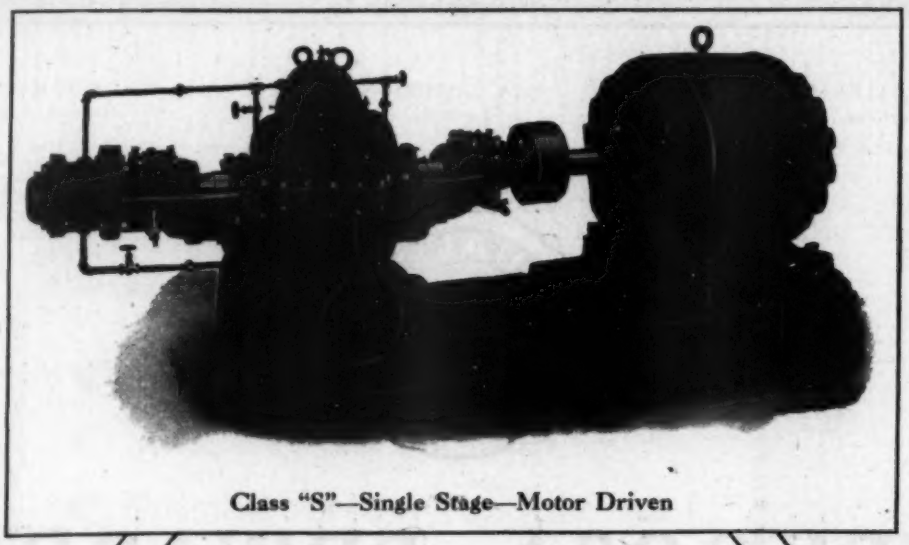

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EDITORIAL

NO doubt everyone in the paper industry knows of the great value that the Forest Products Laboratory, at Madison, Wis., has been, not only to this industry, but to all industries that are interested in wood.

There has been a considerable curtailment in the force of the laboratory recently on the account of lack of funds. Although it will require about $500,000 to handle this work properly for this year, the Secretary of Agriculture has asked Congress for only $350,000, and this sum has already been lessened by the Committee on Agriculture, with the possibility that it will be further lessened by the House and Senate when it finally comes up for decision, not that they do not feel that the money is well spent, but on the ground of a general retrenchment.

This will mean that much of the work that has been started will have to be stopped or curtailed, which means a great loss to the industries interested. Among the more important work as applied to the paper industry that has been conducted, is the following: Pulp and paper, preservation of wood, decay and decay prevention of both pulp wood and wood pulp, chemistry of wood, ethyl alcohol from wood waste, and many others.

The increasing shortage of suitable pulp wood of the species most currently used for that purpose makes more than ever necessary the continuation of studies to determine the suitability of various other available woods for this purpose. An investigation of particular importance, which should be conducted, is that to determine the methods of preventing the enormous losses resulting from decay of ground wood pulp while in storage, as well as protection for the wood pile from fire or decay.

At least $500,000 ought to be given for this laboratory, and the only way it can be secured is for the people in this and other industries, that are interested, to try and induce Congress to furnish the proper funds.

This idea of retrenchment at Washington is a good one, but this does not seem to be the proper place to make the cut.

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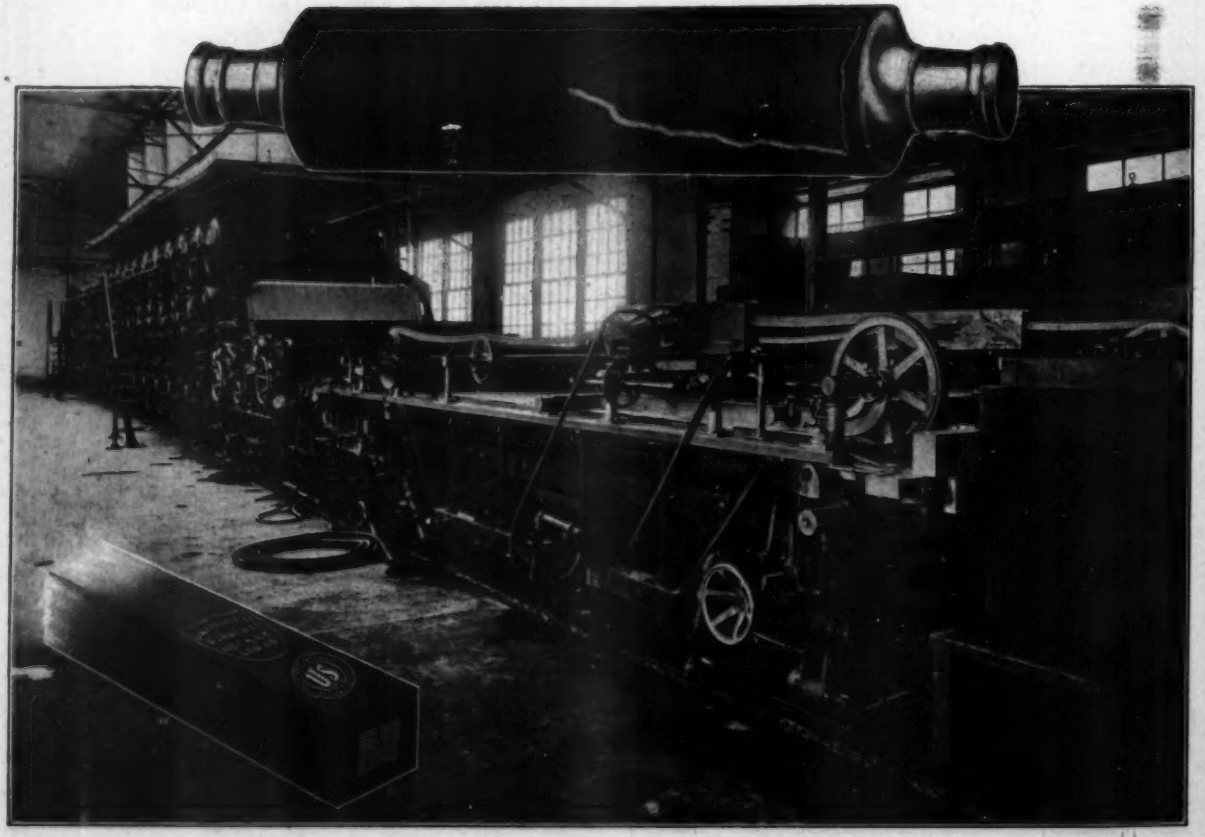
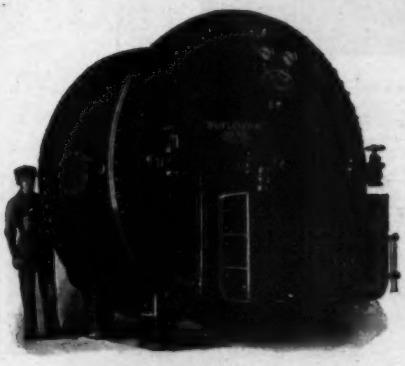


"BUFLOVAK"

Recovery of Sulphite Waste Liquor



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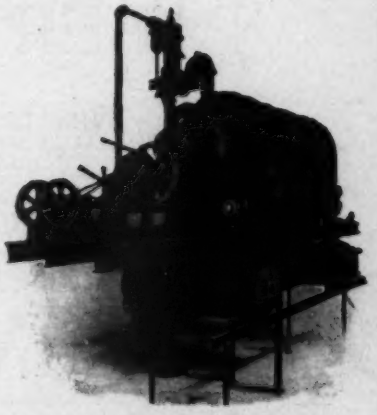

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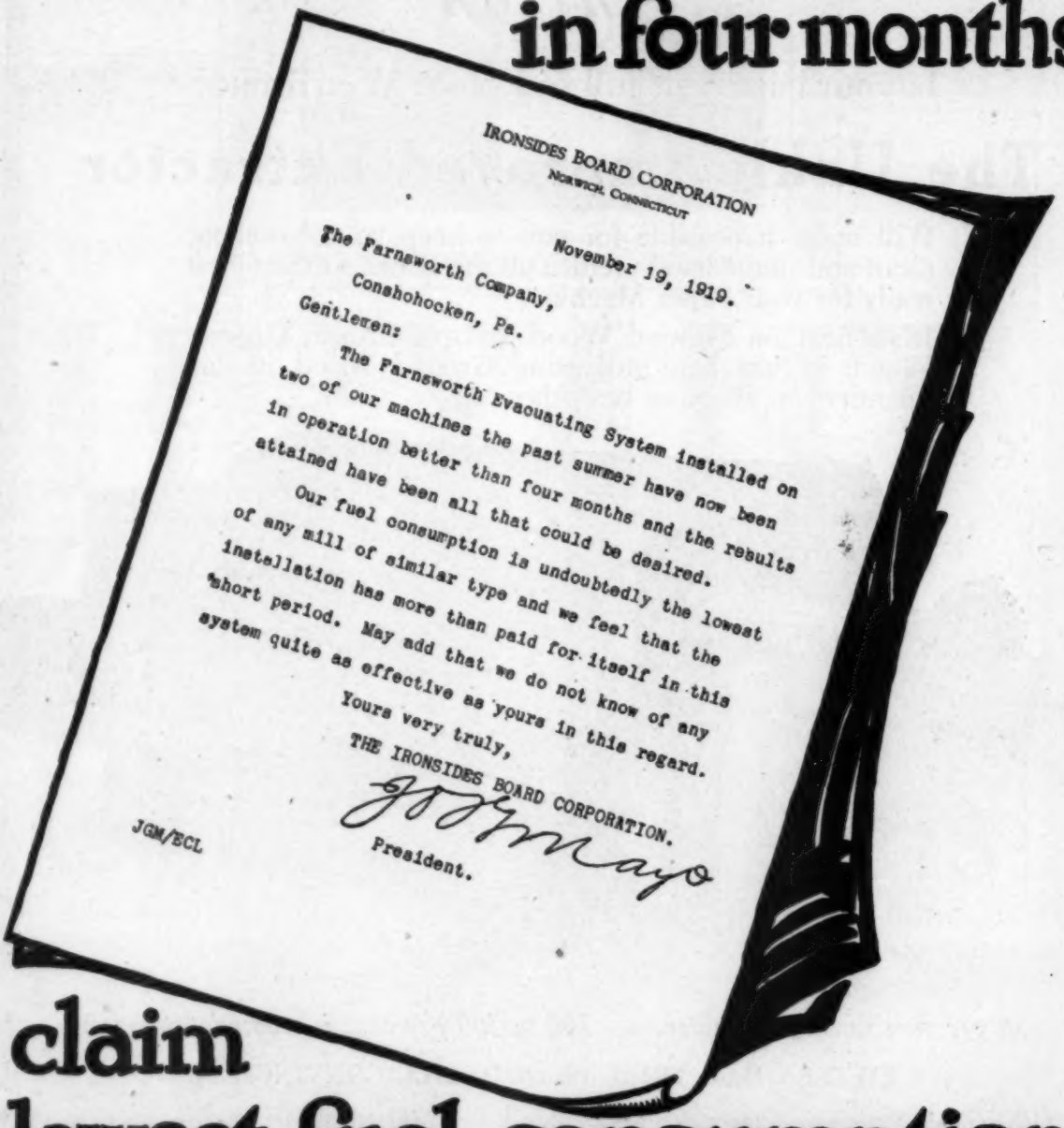

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The Farnsworth Company,
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Gentlemen:

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THE IRONSIDES BOARD CORPORATION.
President.

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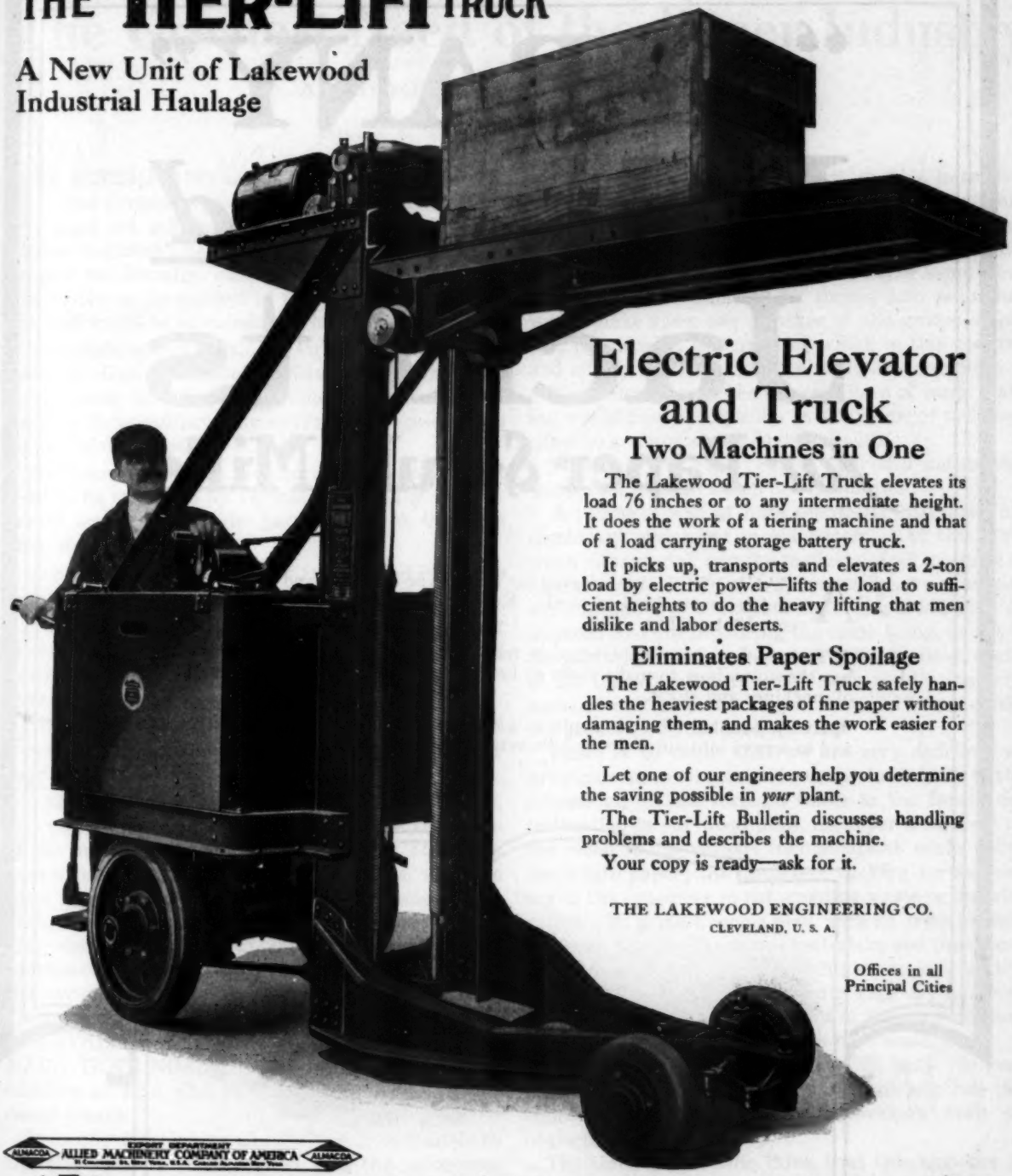

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The Greatest Need of the Paper Industry

AN EDITORIAL BY L. M. ALEXANDER

President of the Nekoosa-Edwards Paper Company

IN ATTEMPTING Series No. 2 on the subject, "The Greatest Need of the Paper Industry," one must not take seriously what the publisher of "Paper Industry" has laid down, as a subject to be treated too literally; otherwise, there would be but one writer on the subject of this Greatest Need, and the rest would be on subsidiary matters.

Emphasis cannot be laid too strongly on deductions from Mr. Geo. W. Sisson's article, that all who work in the paper industry should take more interest and pride in the manufacturing end from the rossed wood to the finished product.

Not many years ago, we can recall the pride that used to be exhibited by various workmen in the different occupations in the particular work in which they were employed.

A humorous story is told of two colored men who indulged in about the following dialogue:

"'Spose you think, Sam, youah working for big concern. The concern I work for used one thousand gallons of ink every year to keep 'count of der business."

"Huh," says Sam, "dat's nothin'; the concern what I work for dey save one thousand gallons of ink every year because dey don't cross der t's or dot der i's."

I had occasion recently to address our foremen, and explain to them that all foremen are the "eyes of the industry" in which they worked. They only were able to keep track of the small things, and keep them in order, and to see that efficiency was accomplished in their particular department; that these eyes were the support of the Superintendent, the backbone of production, the recovery of waste, and the saving of breakdowns and destruction of both life and machinery.

"GATHER UP THE FRAGMENTS THAT REMAIN, THAT NOTHING BE LOST" was the admonition of Him who knew what the value of efficiency meant.

I recently traveled by electric line from Seattle to Everett, and was overwhelmed with the wilderness of waste over this thirty odd miles. Hundreds of thousands of cords of wood in the shape of large and small logs were lying scattered in every direction for miles, and I thought of the many millions of pounds of paper that most of this waste could be converted into. What one can see there, they can see in a more exaggerated form, or to a lesser degree, over hundreds, yes thousands, of miles of railways which have penetrated our great forests. Not all of this waste material is adapted under our present methods of treating wood, but under some form of treatment it could all be turned into pulp that would make some one or other of the grades of paper, the demand and uses for which in this country and all other countries of the world are numerous.

The educated man along proper lines of paper making would have no difficulty in the magic of technical effort to accomplish astounding results.

Where is the Fairy Prince that will polish this wonderful Aladdin Lamp of Possibilities?

A technical man of high repute recently had this significant statement in his letter: "At this time when all material, and the products of all material in mechanical lines are so very expensive, we must use our ingenuity to substitute that which will give us lessened cost for producing the same thing, and it is the part of the real engineer to put the whole strength of his trained mind to secure such results; namely, lessened cost of production in material things without reduction of the cost of labor."

There is no doubt that we are very deficient, as principals, as managers and as superintendents in the prevention of loss through waste in the forest, deterioration in our wood piles, improper treatment of the wood in its various manipulations while being made into paper; the imperfect packing for delivering to the consumer in not avoiding waste or deterioration. To perfect such a plan, such an organization, and such a use of these raw materials, and the chemicals, the coal, the various machinery to give us the perfected product, is undoubtedly THE crying need, if not the Greatest Need, today in the paper industry, and particularly that which uses wood.

In his article, Mr. Sisson has well said, "In perhaps no other industry of equal magnitude has the education and training of its workers been so neglected."

The timid people who think that this business is overdone should broaden their vision, and see that the paper industry, as a whole, has only begun to reach out and supply the ever-increasing needs of the public. Knowledge of the needs and the supplying of such is our duty. The Greatest of these Needs is for us to acquire that knowledge.

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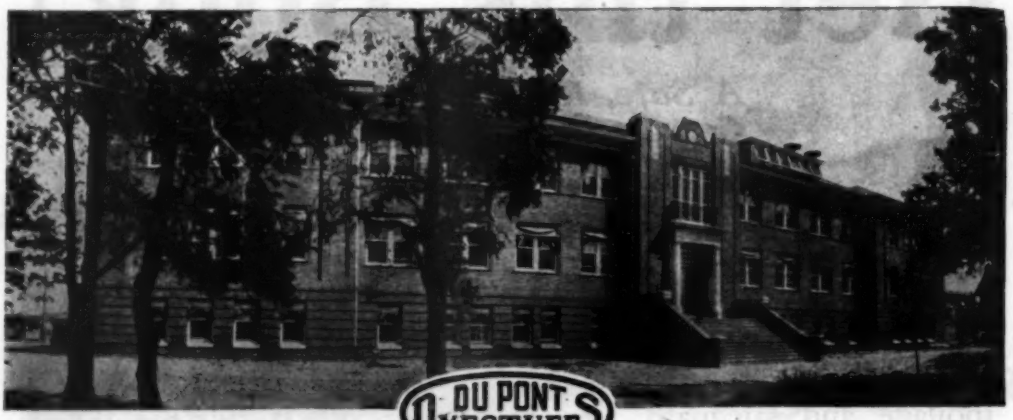

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Dyestuffs Technical Laboratory

We announce the completion and opening of our Technical Laboratory at Deepwater Point, N. J., for the study of experimental and technical problems relating to the application of dyestuffs.

The Technical Laboratory, together with its equipment, has been designed in accordance with the latest advances in modern science and technique. It contains laboratories for the dyeing of textiles, paper and leather, for calico printing and for lake making, an experimental dye house and a very complete and up to date library.

In connection with this laboratory a carefully trained personnel, selected to include specialists in all branches of the application of dyestuffs, is provided to supervise research and application work. In addition, experienced demonstrators are at the disposal of our customers for further assistance in connection with mill problems.

E. I. DU PONT DE NEMOURS & COMPANY, Inc.

Dyestuffs Sales Dept.

Wilmington Delaware

Branch Offices

New York Boston Providence Philadelphia
Chicago Charlotte, N. C.

LINK-BELT
SILENT CHAIN DRIVES

For the Efficient Transmission of Power in Paper Mills

LINK-BELT Silent Chain is the ideal drive for Beaters, Washers, Jordans, Cookers, Calenders and similar paper mill machinery. It transmits power, without slip or loss at an efficiency of 98.2%, **(actual test).** It insures maximum output and maximum efficiency from each machine.

There is no slippage as with belts. There is no necessity for long centers, wasting space. There are no shut-downs due to breaking belts. For with Link-Belt Silent Chain Drives, the power from the driving motor is chained to the driven machinery. Every revolution of the motor shaft means a like revolution of the machine shaft.

Link-Belt Paper Mill Power Transmission Engineers are specialists who devote their entire time to the solution of transmission problems in paper mills. They will gladly give you advice and assistance in bringing your transmissions up to the highest point of efficiency.

LINK-BELT COMPANY

PHILADELPHIA CHICAGO INDIANAPOLIS

New York.....299 Broadway	Seattle.....576 First Ave. S.
Boston.....49 Federal St.	Portland, Ore.....First and Stark Sts.
Pittsburgh.....1501 Park Bldg.	San Francisco.....582 Market St.
St. Louis.....Central Nat'l Bank Bldg.	Los Angeles.....163 N. Los Angeles St.
Buffalo.....547 Ellicott Square	Toronto, Can., Canadian Link-Belt Company, Ltd.
Wilkes-Barre.....2d Nat. Bank Bldg.	Denver....Lindroth, Shubart & Co., Boston Bldg.
Huntington, W. Va.....Robson-Prichard Bldg.	Louisville, Ky.....Frederick Wehle, Starks Bldg.
Cleveland.....429 Rockefeller Bldg.	New Orleans.....C. O. Hinz, Hibernia Bank Bldg.
Detroit.....932 Dime Bank Bldg.	Birmingham, Ala....S. L. Morrow 720 Brown-Marx Bldg.
Minneapolis.....418 S. Third St.	Charlotte, N. C., J. S. Cothran, Com'l Bank Bldg.
Kansas City, Mo.....306 Elmhurst Bldg.	

We believe that American business can be lifted from its present uncertainty only by constructive co-operation—the substitution of intelligent competition for blind, destructive, competition.

AN INVITATION

THE Paper Machine Wire Manufacturers' Industrial Council was formed two years ago for the purpose of improving conditions in the industry by modern constructive co-operation. There has never been, nor will there be, anything to conceal in this co-operation. It is in harmony with both spirit and letter of the Federal Statutes, and more than that, it is conducted in strict accord with a spirit of fairness to employee, competitor and purchaser.

It has been demonstrated to the manufacturers, their employees and many purchasers of Fourdrinier Wires, that this co-operation is thoroughly beneficial to those factors. It seems fitting that those benefits should be explained to the trade at large.

This advertisement is an invitation for all interested in the Paper Trade and its ramifications to learn at first hand of this co-operative work and its effect upon them.

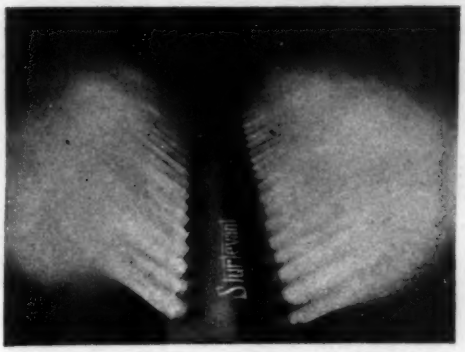
Succeeding advertisements will treat of its aims, ideals and accomplishments in a more detailed way.

Paper Machine Wire Manufacturers' Industrial Council
Directed by the Armstrong Bureau of Related Industries
11 La Salle Street, South, Chicago, Illinois

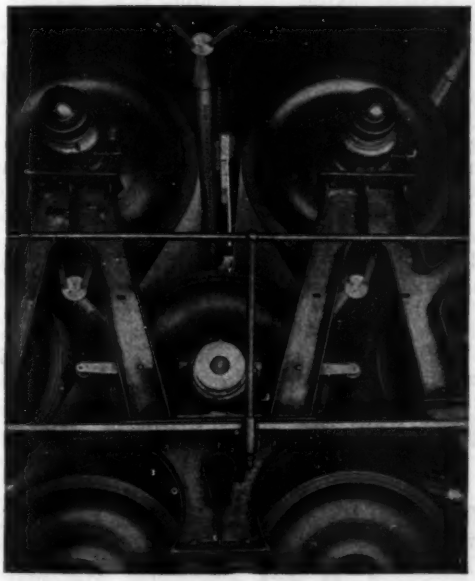
Sturtevant

REG. U.S. PAT. OFF.

PUTS AIR TO WORK



This photograph clearly shows how successfully the Sturtevant Paper Machine Nozzle does its work.



Sturtevant Vapor Absorption System installed on Three-Tier Box Board Machine at the Bogota Paper & Board Co., Bogota, N. J.

This machine is in operation with the paper running over the dryers. The total absence of fog rising from the machine is very different from the condition on a machine not equipped with the Sturtevant System.

REDUCE SUNDAY WORK!

Repairs to the auxiliary machines—engines, motors, fans, blowers, etc., should not be a necessary duty on Sundays when full attention must be given to the primary machines.

Much money is involved in paper production during a year as compared with the net return; therefore, the very best machinery obtainable is a big factor in showing a satisfactory profit when dividends are considered.

Paper drying equipment bearing the Sturtevant trade-mark is a paying investment, principally because it is manufactured to the requirements of the mill. Long association with paper makers has placed us in an excellent position to give you apparatus that will do the drying work in a most satisfactory manner. It is apparatus built for 24 hour a day operation and no Sunday repairs. We know the constant duty paper mill apparatus has to perform and the machines we place in your mill are installed with this fact well considered.

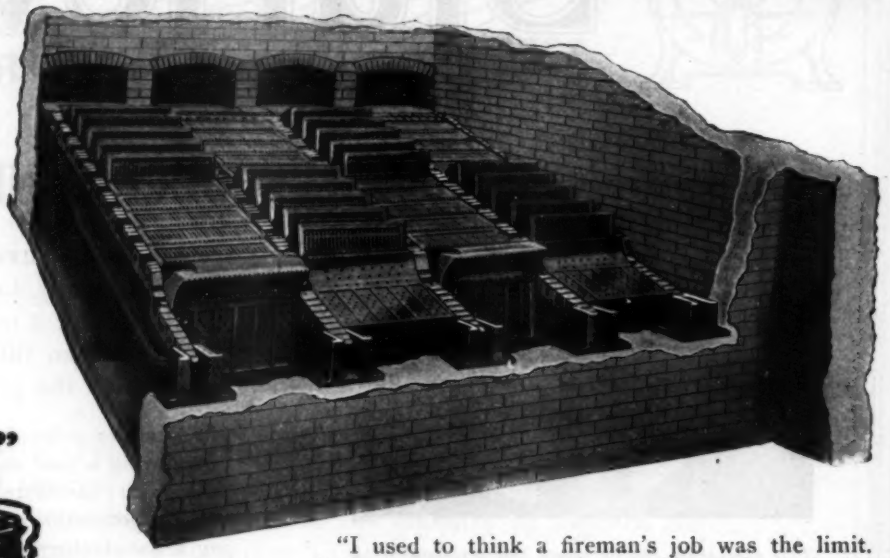
We've installed a large number of these systems that are doing fine work. We would like to have you get first hand opinion from some of the satisfied users. Do not accept our claims for what Sturtevant apparatus will do; ask the superintendent who knows from practical experience. Write us a short letter and we will place you in a position to learn more about these systems.

B. F. STURTEVANT CO.

HYDE PARK, BOSTON, MASS.

AND ALL PRINCIPAL CITIES

The Fireman's Friend



"I'll Say It Is"

"I used to think a fireman's job was the limit. It is, in some power plants. Here it's a picnic! **Files Stokers,** Hand Operated, did it.

"After I throw in a few shovels of coal on the coking plate, I close the firedoors and take it easy. No slicing or raking—no broiling alive cleaning fires of ash and clinkers.

"Notice how these stokers slope to the rear? That helps a lot. By the levers I keep the coal moving slowly to the rear. It gives up the gases gradually and these are consumed as they pass over the fire. The stoker bars keep the firebed even, fine ash falls through into the pit, and **all that's burnable is burned** by the time the cleaning plate is reached. The cleaning plate is counterbalanced, so a simple, easy pull thoroughly cleans your fire.

"It's as good as a movie show! And the combustion's just grand! It's smokeless, too. Look at the stack! That doesn't lie.

"Mechanical stokers cost like thunder to install and operate. That's why the Old Man picked the **Files**—it **doesn't.** But it keeps our boilers steaming to capacity—**and then some.**"

Our booklet fully describes the construction and operation of Files Stokers, Hand Operated. Write for a copy.

THE FILES ENGINEERING CO., Inc.
79 Westminster St., Providence, R. I.

Branches in Principal Cities

Canadian Branch: Booker & McKechnie
285 Beaver Hall Hill, Montreal

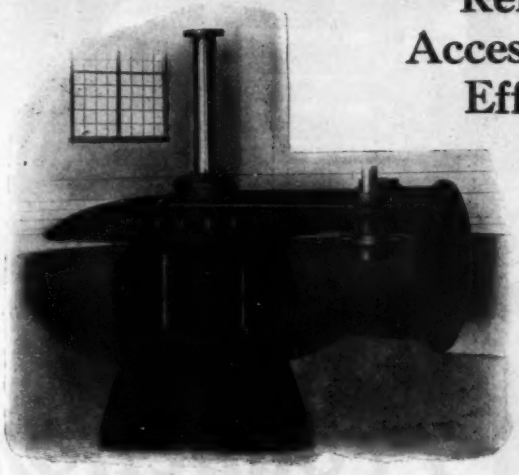
FILES STOKER
Hand Operated

Reliability of Operation
Accessibility to Moving Parts
Efficiency and Stability

ARE A FEW OF THE REASONS WHY

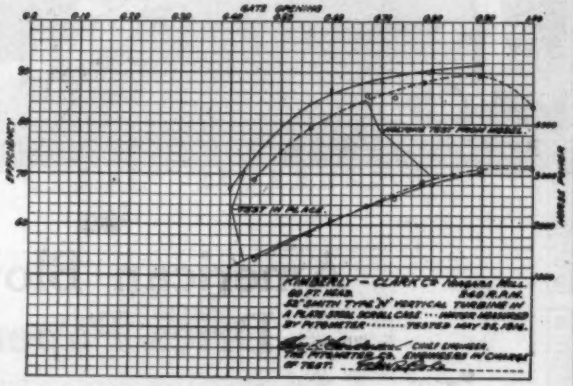
SMITH TURBINES

ARE SELECTED WHEN HIGH GRADE EQUIPMENT IS SPECIFIED



Single Vertical Shaft "Smith" Turbine in steel plate scroll case, installed in the "Niagara Mill" of Kimberly & Clark Co., at Quinnesec, Michigan, developing 3000 H. P. at 240 R. P. M. under 60 feet head.

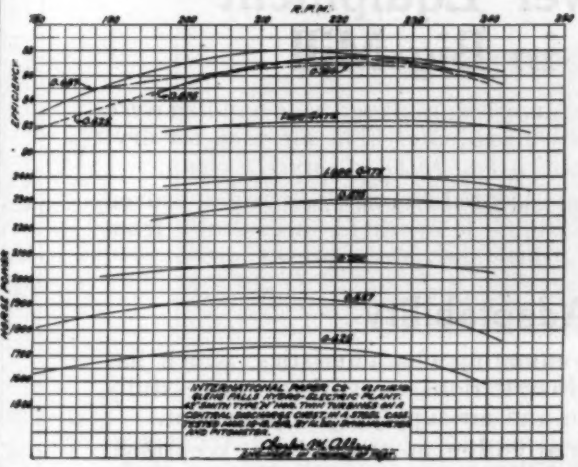
To the right are plotted a set of curves showing comparison between Holyoke model and results in place.


GATE OPENING
EFFICIENCY
HORSE POWER
TEST IN PLACE
KIMBERLY - CLARK Co. Niagara Mill.
60 FT. HEAD. 240 R.P.M.
36" SMITH TYPE 'N' VERTICAL TURBINE IN A PLATE STEEL SCROLL CASE

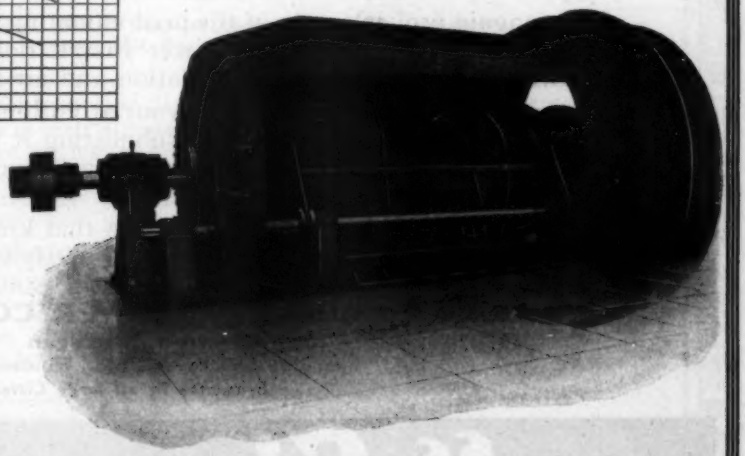
The illustrations herewith show the general design of two widely different types of units.

The accompanying efficiency curves of actual tests under operating conditions are

REMARKABLE EXAMPLES OF HOW SMITH TURBINES "MAKE GOOD"



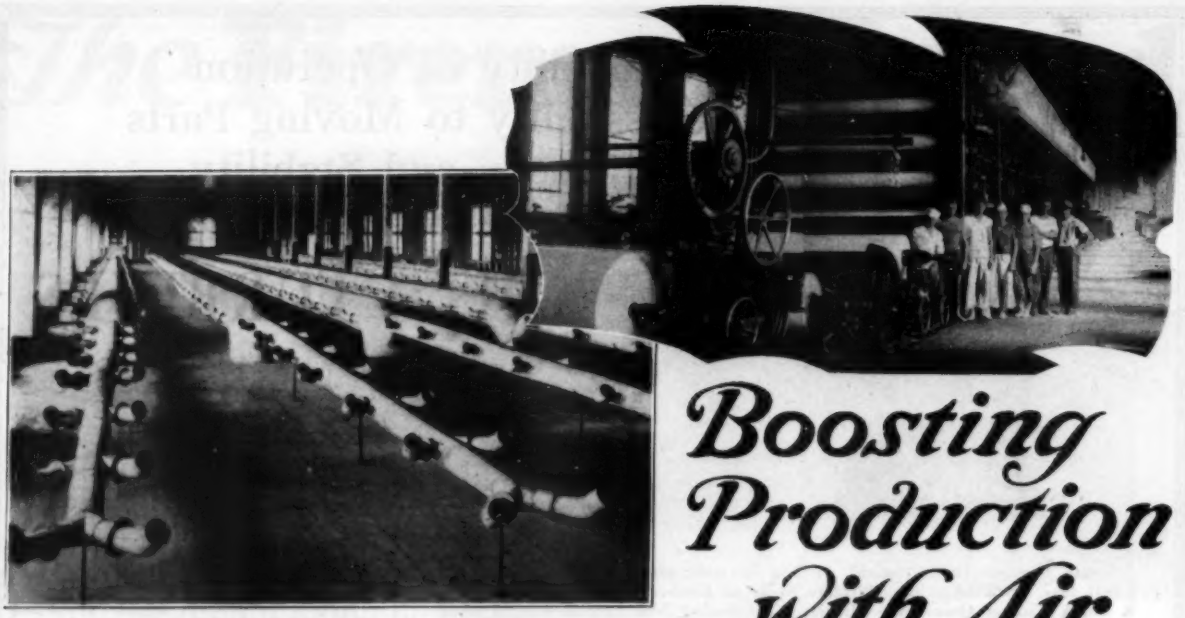
Above curves show extraordinary results obtained in a series of tests conducted by the International Paper Co., at their Glens Falls, N. Y., mill, where a pair of 42" horizontal shaft "Smith" Turbines, as per illustration to the right, are developing 2400 H. P. under 42 feet head.



IF INTERESTED, WRITE DEPT. "S" FOR BULLETIN

S. MORGAN SMITH CO., York, Pa.

Branch Offices: 176 Federal St., BOSTON — 76 W. Monroe St., CHICAGO — 405 Power Bldg., MONTREAL — 461 Market St., SAN FRANCISCO



Boosting Production with Air

American Blower Equipment Dries Paper in Big Mill

IT was quite a problem at first. The quantities of paper to be handled were so great that ordinary means proved inadequate. The air used for drying was needed in large quantities and it *had to be absolutely clean.*

After considering many ideas The Buffalo Coated Paper Company approved the proposed American Blower Installation. It operated successfully from the start, and has been doing this constantly since that date.

Unlimited Adaptability

is here again proven as one of the predominating characteristics, which has put thousands of American Blower Installations to work at successfully meeting every conceivable ventilation and air-supplying requirement.

When any such problem demands your attention, no matter how exceptional it may seem to be, you are safe in submitting it to American Blower Engineers. The truth of this statement is conclusively evidenced by a long record of successful past accomplishment.

"Sirocco," means clean pure air. When that kind of air is needed, think of "Sirocco" Equipment. Investigate it. Specify it.

AMERICAN BLOWER COMPANY
Detroit, Michigan
Canadian Sirocco Co., Ltd., Windsor, Ontario
Branches in all large Cities

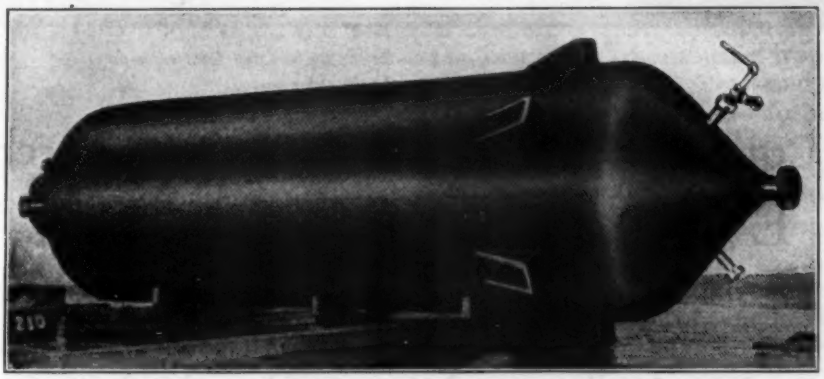
"Sirocco"
TRADE MARK

Kellogg

SEAMLESS WELDED DIGESTERS and TANKS

of All Kinds for

PAPER and PULP MILLS



Testing Seamless Hammer Forged Welded Sulphate Digester for Brown Corporation, La Tuque Mill, Quebec.

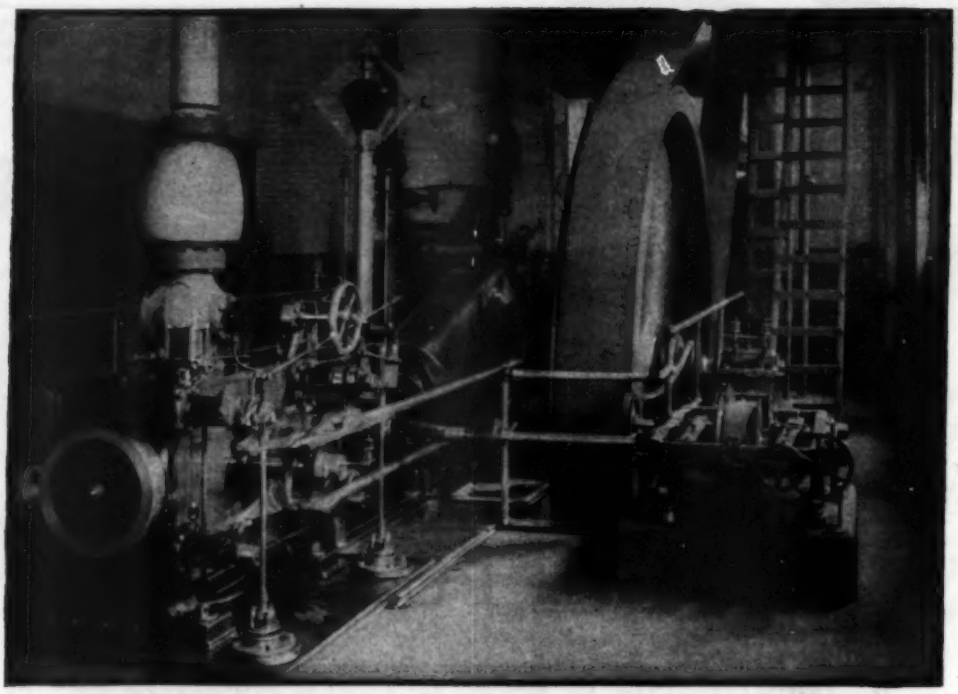
WITH your mill running 24 hours per day and still unable to meet all the demands of your customers, a leak in your digesters or tanks, causing a temporary shut-down for repairs, means a big loss to you. You will avoid all this trouble if you install Kellogg's Seamless Digesters and Tanks, welded by the Forge and Hammer Process, which produces the strongest weld of any process in existence.

We make them of any thickness, diameter or length for paper and pulp mill uses

To the man that is willing to be **"shown,"** just ask us to **prove** their economy and efficiency. A letter will start the ball-a-rolling.

THE M. W. KELLOGG CO.

140 Cedar Street, New York



Hamilton Engine with variable speed device at the Boehme and Rauch Company, Monroe, Michigan

Of Course Your Requirements are Different!

EVERY paper mill power and heat installation is a separate distinct problem.

But no matter how small or large the installation, nor how involved the factors that govern power and heat, there is one big fundamental principle that determines choice.

It is a fact that so much steam must be used for heating purposes there must be a power unit that will take the energy from the steam before passing it to the heating system—and the ideal installation should include one or more

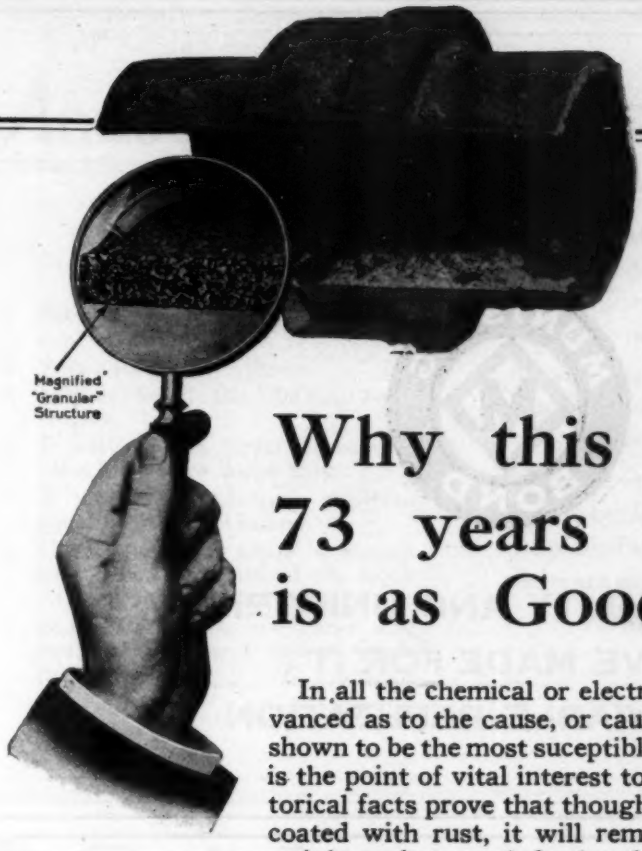
HAMILTON

CORLISS ENGINES

Apart from the efficiency of Hamilton Engines, there is a sure, steady reliability that eliminates the probability of costly shut-downs. The simplicity of design, construction and operation, the adaptability of Hamilton Engines under varying load and speed conditions in paper mills have been demonstrated over a long period of years.

Write for our new bulletin "Hamilton Corliss Engines in Paper Industry."

THE HOOVEN, OWENS, RENTSCHLER COMPANY, Hamilton, Ohio



Why this Pipe, after 73 years of Service is as Good as New

In all the chemical or electro-chemical theories so far advanced as to the cause, or causes, of rust, cast iron has been shown to be the most suceptible to rust. Yet—and right here is the point of vital interest to users of pipe—authentic, historical facts prove that though cast iron will become quickly coated with rust, it will remain practically unimpaired in weight and strength for hundreds of years under conditions that would prove fatal to rolled wrought iron or steel in 10 to 20 years.

Why? Because cast iron possesses a structure of the same granular or crystalline form as that possessed by the iron ore from which it is made.

Once nature has formed a rust coating of the loose crystals on or near the surface of the metal and the oxide penetrates between the crystals held together by natural metallic bonds, the force exerted by the absorption of moisture is not sufficient to separate them, and the oxide remains as a permanent coating.

Rusting is slow combustion. Combustion cannot take place without the presence of oxygen. Nature's own protective coating, by excluding oxygen, prevents combustion.

SERVICE MEASURED BY CENTURIES

The
Cast Iron Pipe Publicity Bureau
1 Broadway, New York

MUNISING PAPER COMPANY

MUNISING MICHIGAN

MANUFACTURERS OF

MUNISING M BOND

COLOR QUALITY AND UNIFORMITY
HAVE MADE FOR IT
AN ENVIABLE REPUTATION

Uniform

CHAS. A. DEWING
President

JOHN A. PYL
Secy. and Treas.

A. G. GILMAN
Vice Pres. and Gen. Mgr.

JOHN. W. POWELL
Sales Manager

Reliable

The "MONARCH"

BOOK PAPERS

EGGSHELL, MACHINE, ENGLISH, SUPERCALENDERED, and ENAMEL GRADES

Monarch Paper Co.
Kalamazoo Mich.

Announcement

THIS should be welcome news for the Paper Manufacturers and in the minds of the Thinking Men of the Paper World. A new compressed Air Shake for paper making machines and one that will close a sheet of paper to perfection.

All who have examined this modern and practical device and the results obtained from it have this to say:

"Think every paper machine should and will be equipped with the Shake as soon as the manufacturers learn of the possibilities there are in a machine of this kind."

For further information, write

WM. C. NASH,
Neenah, Wisconsin.

The Possibilities

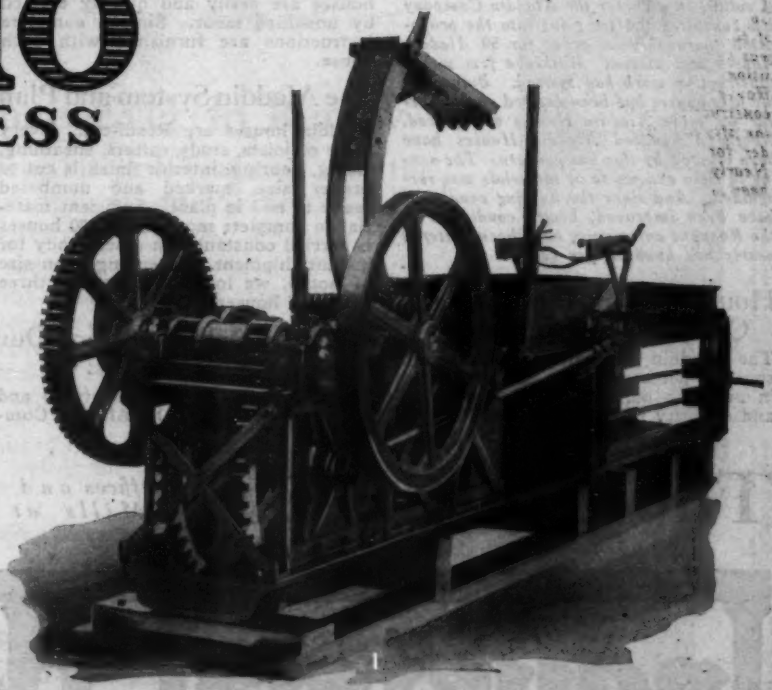
1. As near a continuous motion as can be made.
2. Soft and uniform throw.
3. Will not buckle the tube rolls from the jar.
4. It will carry a larger percent of filler by a more dense sheet.
5. A smoother and more uniform sheet of paper obtained.
6. Can be adjusted while in motion to suit the condition of the stock without any waste of paper.
7. It is easy on the machinery and neat in appearance and is worth investigating.

FAMOUS Ohio BALING PRESS

EVERY one of the hundreds in operation prove up on the job with unexcelled performance. Their enormous capacity—continuous service, speed, and rugged strength, their safety of operation allow them to speak for themselves.

An owner writes that one-half the labor does the work in one-fourth of the time, allowing them to load cars to a much greater capacity. They now have three Ohio Presses in operation in their different plants.

To make your Salvage Department pay, write us your pressing requirement.



The Ohio Cultivator *Co.*
Bellevue, Ohio

Aladdin

Roanoke Mills Co. Consult Aladdin Instead of Doctor

Besides a costly labor turnover, causing a lessening of production the Roanoke Mills Co. had a health problem to solve. Instead of calling in a doctor the Aladdin Company was consulted. After going into the proposition thoroughly an order for 50 Aladdin Houses was placed. Within a few weeks construction work had started. Before all the fifty houses had been erected another order for more Aladdin Homes was placed. Nearly a hundred Aladdin Houses have been erected by this one concern. The saving in time and waste of materials was recognized. And since the housing conditions have been improved, health conditions in the Roanoke community have been bettered nearly one hundred per cent.

Housing Your Men Well and Quickly at Lowest Costs

The Aladdin System of Construction saves 18 per cent of the lumber wasted in ordinary building. Standardization and quantity production further reduce the building cost approximately 30% to you. Also you benefit by Aladdin's stupendous purchasing power. Aladdin houses are easily and quickly erected by unskilled labor. Simple, complete instructions are furnished with each house.

The Aladdin System and Plan

Aladdin houses are Readi-cut. Every piece of joists, studs, rafters, sheathing, siding, flooring, interior finish is cut to proper size, marked and numbered ready to nail in place. Sufficient material to complete more than 3000 houses is carried constantly in stock ready for instant shipment. Depending upon size of house, we load from one to three complete houses in each car.

Quicker Delivery from Our Five Mills

Aladdin houses are manufactured and shipped direct from the Aladdin Company's own mills in Michigan, North Carolina, Oregon, Mississippi and Canada. Aladdin houses come to you in a straight line from the nearest timber region. Aladdin's Industrial Home Building Service means shorter routes, quicker delivery and lower freight rates for builders in every part of the United States. Three days to a week are saved in shipments reaching destination. Complete Sales and Business Offices are maintained in connection with each mill. Fully 24 hours' time is saved in your mail reaching our offices.

Single House or Complete Cities

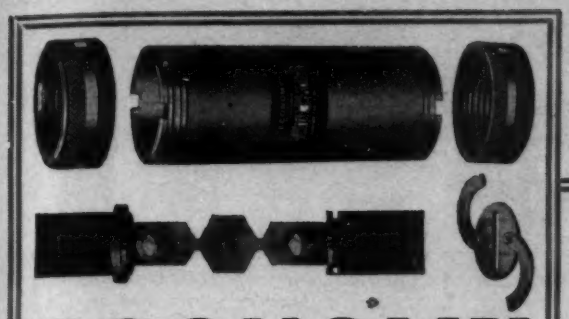
We will quote you a definite price on a single house or complete cities of 300, 500, 600, 1500 and 3000 population. These cities include homes, stores, churches, schools, offices, etc. Several cities are now graphically presented in our book, "Industrial Housing." Write, wire or phone for Book No. 1823.

The Aladdin Co.

Offices and Mills at

Bay City, Michigan
Wilmington, North Carolina
Hattiesburg, Mississippi
Portland, Oregon
Toronto, Ontario

Industrial Housing



ECONOMY

Approved by the Underwriters' Laboratories, Dec. 1, 1919—Ferrule and Knife Blade Types 0 to 600 amperes in both 250 and 600 volts.

On Dec. 3—Plug type approved in all capacities 0 to 30 amperes, 125 volts.

Correcting a False Impression

For months our factory has been shipping the new type of Economy Knife Blade Fuse. A one-piece winged end washer allows re-assembly of a blown fuse in a few minutes. The heavy brass caps are knurled and engage the accurately threaded ends of the gray fibre cartridge with the slightest effort. Our customers may find a few Economy Fuses with plain end caps on the jobbers' shelves, but as the demand for Economy Fuses always exceeds the supply, it is likely that at this date only the type "easier than ever to renew" is available.

Easier Than Ever to Renew

Study the renewable link feature. See the two narrow bridges of metal holding the "Drop Out" feature in place. In operation on short circuits, these two bridges fuse. The entire fuse metal does not volatilize, only the two narrow bridges. This very greatly decreases the danger factor due to the tremendous pressure generated when an entire strip of fusible metal is instantly converted into gases. No powdered filler to deteriorate or solidify. Only the fuse metal is destroyed; the fuse itself is ready for years of service. See the new winged washer which makes it simple and easy for anyone to replace the "Drop Out" Renewal Link in a few minutes.

Sold by all leading electrical jobbers and dealers

ECONOMY FUSE & MFG. CO.
Kinzie and Orleans Sts., Chicago, Illinois

Economy Fuses Are Also Made in Canada at Montreal

Sta-white makes a difference that you can appreciate - a brighter and more sanitary plant, and by reason of its durability painting costs are held to the lowest ultimate point

Transformation—From Dark to Light

The improved lighting, improved appearance and improved working conditions procured through the application of a good, white, light-reflecting paint to walls and ceilings—is magic-like in results.

STA-WHITE—the pure white oil paint for industrial interiors—is a wonder worker in brightening up interiors of workrooms. It reflects and utilizes all the light.

STA-WHITE can be used without the hazard of experiment—it stays white the year 'round.

Economically applied by air or brush.

Write for a Copy of Book "Lighting Industrial Interiors"

DETROIT GRAPHITE CO., 110 Twelfth St., DETROIT, U.S.A.

Makers of Paints in all Colors for all Purposes

Offices and Warehouse Stocks in all Principal Cities

Manufactured in Canada by Dominion Paint Works, Ltd. Walkerville, Ontario

STA-WHITE MAKES THE DIFFERENCE

The Relation of the Physical Constants of Paper to Its Printing Characteristics

By OTTO KRESS
In Charge of Pulp and Paper Section, Forests Products Laboratory, Madison, Wisconsin

Presented at the Meeting of the American Pulp and Paper Mill Superintendents' Association on November 7, 1919, at the Congress Hotel, Chicago

PAPER is essentially an interwoven sheet of vegetable fiber, which may be modified by sizing, coloring, loading, coating, calendering, etc., to meet the various demands of the consumer. As the paper manufacturer does not deal with pure cellulose, but with a varying raw material such as the different wood pulps and rag stocks, and as he converts these raw materials through a complex manufacturing process into finished paper, it is not surprising that the finished papers produced at different mills often show considerable variation in their physical characteristics.

For a detailed description of the methods of physical, microscopic, and chemical analysis of paper, I would refer you to a report by Frederick C. Clark, Chairman of the Committee on Paper Testing of the Technical Association of the Pulp and Paper Industry, published in "Paper," October 17 and 24, 1917, Vol. XXI, numbers 6 and 7, or to Papierprüfung by Wilhelm Herzberg.

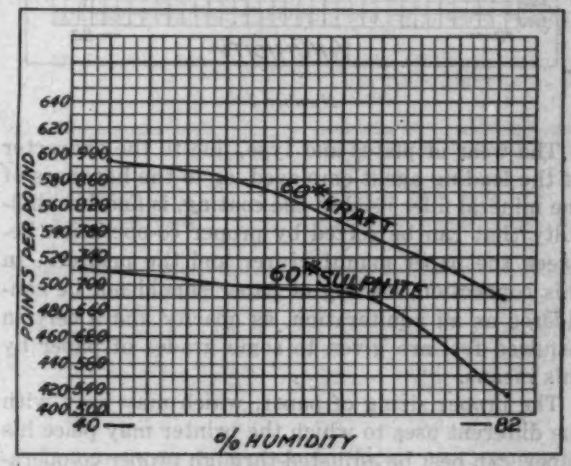
The speaker was asked by your secretary to address a few remarks regarding the relations existing between the physical constants of paper and their printing characteristics.

Some of the properties of the paper of most direct importance to the printer are the following:

1. Color and glare.
2. Fuzz.
3. Wear of type or plates as affected by fillers or coating.
4. Size or ink resistance.
5. Bulk.
6. Moisture.

The significance of color and glare to printing is twofold; first, the importance of uniformity of the color and finish; and secondly, the relation of these characteristics of the paper on the eyesight of the reader. Producing paper of uniform color and glare is a direct mill problem which offers no special difficulty.

The Forest Products Laboratory has carried on considerable work attempting to correlate the eye fatigue of the reader with the color and glare of the printed paper. This investigation was discontinued due to lack of funds, but some interesting data were obtained. In this investigation four papers were used: (1) a blue newsprint paper, (2) a pink newsprint paper, (3) a laid matte paper, (4) a highly-calendered coated paper. Color readings of the paper were made with the tint photometer, and percentage glare measured by a special instrument, known as a glarimeter. These papers were printed in the form of galley proof, using as text a popular history of the New York Savings Bank Association, the type used being known as 10 point Modern Roman, two-point leaded. A group of readers who knew nothing of the object of the tests, but who were reliable investigators, were chosen as subjects. Time does not permit a description of the method of conducting the test nor of the means employed to measure eye fatigue.



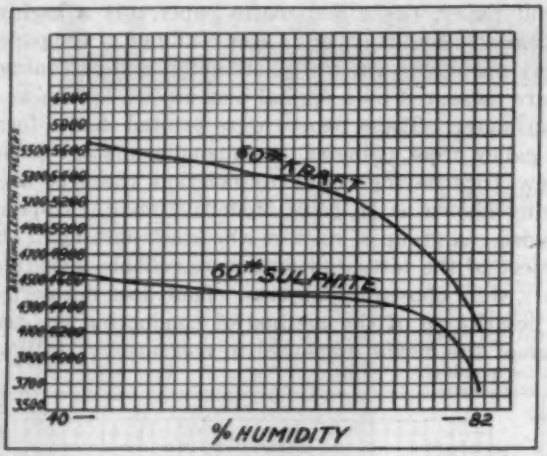
Number 1

In general, it was found that ocular fatigue correlates more closely with the glare of paper than with the color. The matte white paper which showed the lowest glare reading was most satisfactory, or proved to be least fatiguing to the eyes of the readers. The blue and pink papers appeared intermediate, while the highly-calendered coated paper which showed the highest percentage glare was in comparison with the other papers decidedly fatiguing to the eyes of the readers.

It is, of course, common knowledge that a paper with a high glare or finish and also that some colored papers are decidedly fatiguing to the eye. Considerable work might well be done, and the results used by the printer in enabling him to specify the color and

finish of the paper most suitable for his special purpose.

By fuzz is meant the dog hairs or lint on the paper, which causes the printer difficulty by clogging his type, and so interfering with a sharp and clear reproduction of his cut or print. Wells has found that by the proper pulping of aspen wood, the fuzz may largely be eliminated. This trouble may be further controlled by beating and sizing. In general, the trouble from fuzz is a pulp and paper making problem that can generally be controlled.



Number 2

The wear of plates and type, due to the character of the loading agent employed, or to the hardness of the mineral filler used in the coating, is another difficulty that can be solved by proper co-operation between the paper manufacturer and the printer. In this connection, loading of paper should not be considered as an adulteration, as opacity and a certain required feel are given to some grades of paper by this means.

The proper sizing of paper, which may vary with the different uses to which the printer may place his paper, can best be adjusted through proper co-operation with the paper mill. The same adjustment applies in regard to determining the proper bulk of the paper to be used for a specified purpose.

The effect of varying humidity on the strength and stretch of paper is of utmost importance to the printer. Samples of paper taken for testing purposes at the mill and later at the point of destination may show a decided variation in their so-called physical constants caused entirely by variations in the percentage of moisture in the paper.

The speaker carried on a series of strength tests, made at 41, 53, 64, 65, 77 and 82 per cent relative humidity, on 13 commercial papers to determine their variation in strength and percentage stretch under varying humidity conditions. These papers were all of "wild" formation, making it difficult to obtain uniform results. They were divided into four series.

Series 1, known as groundwood-sulphite papers, was supplied in 25, 30 and 34-lb. weights and was made, according to the mill submitting these samples, on a furnish of

30% groundwood.
70% sulphite pulp.

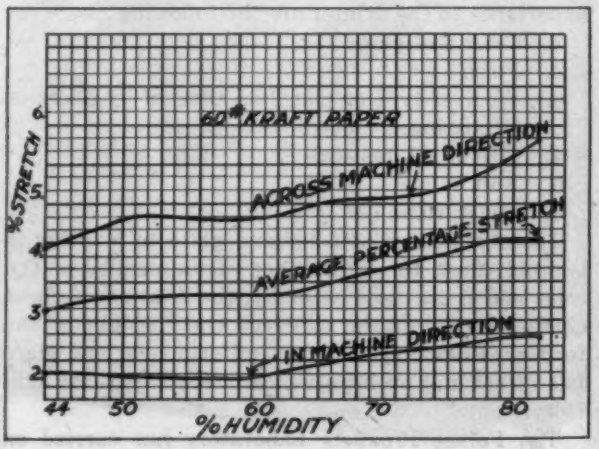
Series 2 consisted of papers made on an all-sulphite furnish in weights of 25, 40 and 60 pounds.

Series 3 and 4 represent kraft papers of two different shipments from the same mill. Series 3 consisted of samples of 25, 30, 40 and 50-pound papers, while series 4 consisted of 30, 40 and 60-pound papers.

The conclusions obtained from this investigation may be summarized as follows:

1. The value of points per pound decreases with the increase in relative humidity. Reduction in strength after a relative humidity of 65 per cent is reached is much more rapid than before. For example, on the groundwood-sulphite mixture (Series 1), taking the strength at 65 per cent relative humidity as standard, the average variation for the three papers was 8 per cent for the humidity change from 41 per cent to 65 per cent, while from 65 per cent to 82 per cent the drop was 21.5 per cent, giving a total variation in strength of almost 30 per cent from the strength at 65 per cent relative humidity. On the No. 1 kraft (Series 4), the variation from 44 per cent to 64 per cent relative humidity was 13.7 per cent, while from 64 to 82 per cent the difference in strength was 11.9 per cent, the total variation in strength being nearly 26 per cent from that at 65 per cent relative humidity.

2. A similar conclusion seems to hold for the breaking length. About 70 to 75 per cent relative humidity, the strength falls more rapidly than between 40 per cent and 75 per cent relative humidity.

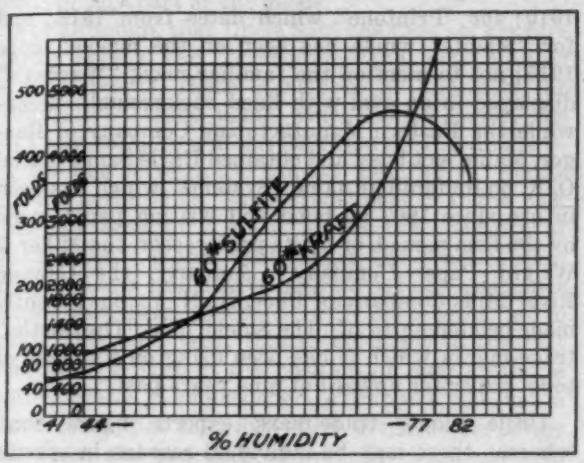


Number 3

For the groundwood-sulphite mixture (Series 1), again taking the values at 65 per cent as standard, the variation in breaking length from 41 to 65 per cent relative humidity is 10 per cent, while an in-

crease in humidity from 65 per cent to 82 per cent causes a reduction in the breaking length of 27.2 per cent, a total variation of over 37 per cent. For the No. 1 kraft (Series 4), the variation in breaking length for the humidity change from 44 to 64 per cent was 6.4 per cent, while with an increase in humidity from 64 per cent to 82 per cent the drop in breaking length was 19.3 per cent, a total variation of 25.7 per cent.

3. The stretch of the paper increases with increase in relative humidity, the variation being rather more regular than with points per pound and



Number 4

breaking length. For the groundwood-sulphite mixture (Series 1), the stretch increased 17.0 per cent with increase in relative humidity from 41 per cent to 65 per cent, and 31 per cent with increase in humidity from 65 per cent to 82 per cent. For the No. 1 kraft (Series 4), the stretch increased 20.4 per cent with increase in relative humidity from 44 per cent to 64 per cent, and 18.7 per cent with increase in humidity from 64 per cent to 82 per cent.

4. The folding properties seem to be affected to a greater degree than any other property. For the groundwood-sulphite mixture and the all-sulphite papers, the resistance to folding increased tremendously between 55 and 77 per cent relative humidity, a further increase in the moisture content, however, causing the folding strength to break sharply. With the kraft papers, the folding strength increased with the increase in humidity, and at the most saturated condition used (82 per cent) the papers showed far greater folding strength than at 77 per cent. For the groundwood-sulphite paper, the number of folds increased 153 per cent with a humidity increase from 41 per cent to 77 per cent. Above 77 per cent relative humidity the folding strength decreased, showing that the percentage of relative humidity giving greatest folding strength had been passed. For the 30-lb. kraft paper of Series 4, the number of folds increased from 348 at 44 per cent relative humidity to 1,980 folds at 82 per cent relative humidity, an increase of 470 per cent, while the 60-lb. kraft paper showed an increase of 588 per cent in the folding strength in varying the relative humidity from 44 to 82 per cent.

In order to obtain some data on the moisture regain of various papers under varying conditions of humidity and temperature, 26 papers made on various furnishes were studied at 47, 65, 81, 87 and 95 per cent humidity at temperatures closely approximating 78 degrees F. It was found that the increase in moisture content varies directly as the moisture content of the air increased, and that only under excessively high humidity conditions does the curve depart from a straight line. If the moisture content of a given paper for one definite humidity is known, then the percentage of moisture for all the ranges ordinarily encountered can be calculated without serious error by direct proportion. The following data obtained on various book papers may be of interest.

Samples	Class of Paper	Approximate Furnish
A	Antique wove, white tablet.	Sulphite 51%, soda 49%, rosin size 1.4%, alum 3.5%, clay 13.3%.
B	M. F. white litho.....	Sulphite 59%, soda 41%, rosin size 1.4%, alum 4.0%, clay 13.3%.
C	White super book.....	Sulphite 38%, soda 62%, rosin size 1.4%, alum 2.6%, clay 22.2%.
D	Laid book.....	Sulphite 50%, soda 50%.
E	Enameled book.....	Rag 20%, sulphite 50%, soda 30%.

Absorption of Moisture at Different Conditions of Relative Humidity—Based on Bone Dry Weights

Paper Sample	47% at 78° F.	65% at 76° F.	81% at 75° F.	87% at 78° F.	95% at 84° F.
A	4.5	6.1	7.9	10.5	16.0
B	4.8	6.6	8.4	10.7	15.9
C	4.5	6.1	7.7	9.6	14.4
D	5.7	7.1	9.3	11.3	17.0
E	5.6	6.9	8.7	10.9	19.1

The few examples quoted indicate the tremendous influence of varying humidity on the percentage stretch and strength of paper. The printer is not so much interested in strength as in variations in the percentage stretch across and in the machine direction of the paper. By proper seasoning of the paper in the press room preparatory to use, and by the proper control of the humidity of the air, some of these difficulties may be partly overcome. The printers either individually or through their association might well study some of the fundamental factors influencing the absorption of moisture and the proper seasoning of paper.

Developments of the Year in Trade-Marking of Paper and Pulp Products

By WALDON FAWCETT

TO SAY that paper tradesmen and makers and marketers of pulp products are awakening to deepened appreciation of the importance of trade-marking their distinctive specialties, might appear, at first blush, a rash statement with respect to an industry that has long been recognized as ultra progressive in seeking ways and means to establish the individuality of its products. However, we have the indisputable evidence of the records of the United States Patent Office to prove that the past twelve months has constituted a year of unparalleled activity in the branding of paper and paper products.

Strictly speaking, the significant record of the past year is eloquent not so much of a stronger disposition to nickname paper products (although that is involved, incidentally) as of a keener desire to secure maximum protection under the law for paper trade-marks that have become valuable or bid fair to become valuable. The gauge of trade-mark activity afforded by the day-to-day transactions at Uncle Sam's trade-mark office is not, be it explained, primarily a reflex of the new names coined or symbols selected, but rather is the measure of current desire on the part of business houses to safeguard their business badges by securing Governmental credentials attesting their right of exclusive use.

It may happen that the volume of applications received from a given industry for trade-mark registration at the United States Patent Office may surpass the current christenings of new products—provided, of course, some of the factors in the trade have neglected in past years to have Uncle Sam sanction their commercial coat-of-arms. This is precisely what has come to pass in the paper industry. Paper and pulp product men have never, as a class been remiss in identifying their products, but in not a few instances they have neglected, seemingly to secure the Federal certificates that serve as evidence of sole possession. Accordingly we find the formal enrollment during the past year not merely of newly coined paper-trade names, but likewise of many marks that have been well known to the trade for some years past.

Marking Established Brands

As an illustration of how long-established leaders in the trade have bestirred themselves of late to insure their titles to trade-marks that are the hostages of valuable good-will, it may be cited that S. D. Warren Company of Boston has within recent months obtained official sanction for brands that have long since won their places in the trade. Thus, the Warren Company has lately obtained certificates of enrollment for "Cameo" which has been in use since 1902; for "Artogravure" which has been employed since 1910; for "Printone" which dates from 1912; and for "Silkote" which has been on the market since 1915; not to mention the familiar mark "Warren's" displayed in an oval with lined background. Meanwhile the Eastern Manufacturing Company of Bangor, Maine, got busy and obtained Uncle Sam's official O. K. on its familiar name "Systems" which has been in use since 1907 on bond and writing paper made by the firm named, or by its predecessor, the Miller & Wright Paper Company. Similarly, the Oswego River Mills Company of Phoenix, N. Y., has recently made belated entry of "The Shield" and "The Castle," trade-marks which it has been using on its make of toilet paper for upward of nine years past.

Uncle Sam's trade-mark experts figure that, whereas there may be individual reasons in specific instances for the latter-day scramble of paper tradesmen to get into the trade-mark registration fold, there are certain general influences that just at this time are caluclated to spur brand enlistment on the part of firms in the industry. The prospect of keener competition in the years to come is one explanation. Another is the national advertising to the consuming public of papers that it is desirable shall be indelibly identified by name or emblem. Most potent of all, it is surmised, is the increased extent to which producers of Yankee paper products are entering the export trade. As it happens, too, the paper firms that have joined hands, as authorized by the Webb Act, for joint selling abroad have not, as have some groups of manufacturers in other lines, pooled issues under a collective or co-operative trade-mark, but have instead undertaken the associate exploitation of the private trade-marks of the various members of the selling alliance. This employment, farther afield and on a more extensive scale, of American trade-marks renders it all the more important, obviously, that the marks shall have the official authentication at Washington, without which they cannot gain corresponding recognition in foreign capitals.

"Suggestive" Trade Names Allowed

If there is one aspect of the trade-mark developments of the past year, that from the trade standpoint, is especially gratifying, it is to be found in the manifestation by the chief censors at the capital

of a spirit of greater leniency with respect to what are known as "suggestive" trade names. It goes without saying that the average man in the paper trade would, if he had free choice when christening a new product, choose a word or a name descriptive of his product or of the quality or uses of that product. But, unfortunately, the law expressly forbids the acceptance of a "descriptive" trade-mark and this prohibition has been ruled to apply not merely to words that interpret the virtues of the branded article but likewise to pictures that serve to describe the goods—for example, pictures of the goods or any part of the goods.

For although, that Uncle Sam has thus set his face sternly against the "descriptive," that most-coveted of trade-marks, there is held to be allowable the "suggestive" trade name which is, of course, the next best thing to a descriptive mark. It is in drawing the line between the banned "descriptive" marks and the permissible "suggestive" ones that the past year has brought a spirit of greater liberality at Washington. Words that, under the practice of a few years ago, would have been turned down as paper marks have been welcomed with open arms, so to speak, this past year, thanks no doubt to the fact that there is now in the position of final arbiter a United States Commissioner of Patents who has a better conception than any of his predecessors of the conditions and practices of everyday business. All this is of prime importance to paper tradesmen because it is conceded that the suggestive word makes the ideal trade-mark, the one that, just in proportion as it stirs the imagination of the everyday customer or prospective customers, is an aid in selling.

As indicative of the triumph in recent months of the type of suggestive name that can perform constructive services in the paper industry, there may be cited the luck of the Gopher Envelope Company of Minneapolis in securing the acceptance at Washington of "Fiberope" as a trade-mark for mailing envelopes. "Artcraft" for wall paper, approved for use by Benjamin Buchbinder of New York, is another example, and so is "Silfoil," approved for use by the Nashua Gummed and Coated Paper Company of Nashua, N. H., on its make of paper coated with a silver-like coating. The Albany Perforated Wrapping Company of Albany, N. Y., secured during the year a certificate for "Onliwon" as a trade-mark for paper towels, despite the warning issued at the patent office, not so long ago, to the effect that the ruse of misspelling would not permit a trade name to get by if it was construed to be descriptive. Of the newly-enrolled names that embody the suggestive or inspirational element in the subtle form, there may be instanced "Priority" and "Commission" that have lately been preempted for use on writing and printing paper by the American Writing Paper Company of Holyoke, Mass. The Warren Company's entry "Library Text" is in the same category, and so apparently is "Profit-Sharing" to which the Beekman Paper & Card Company of New York has staked claim as a mark for writing and printing papers.

Ban on "Public Insignias" Modified

Next to the wider latitude allowed in the use for trade purposes of suggestive names that come close to the border line of the descriptive, an outstanding feature of the developments of the year has been the manifestation by the Government of a more generous spirit with respect to commercial encroachments upon what are known as "public insignias." During the war there was a disposition in some quarters to shut down on the use of anything that remotely resembled the United States Flag or any of the emblems of Federal authority. That there has been a passing of the inclination to carry this to extremes seems to be indicated by the admission, recently, to Uncle Sam's trade-mark register of a representation of an eagle on a shield, which Charles Drury Jacobs of New York is employing as a mark for writing and printing papers.

The National Papeterie Company of Springfield, Mass., ran afoul of this ban on public insignia, so called, when it essayed some time since to register as an identifying mark for paper and envelopes a representation of the United States service flag and the phrase "We Won't Forget You," but during the past year it has obtained certificates for other marks that are suggestive of the same spirit or atmosphere as that embodied in the unsuccessful candidate. The accepted innovations were "Home Folks," "National Hero," and "Over There," all designed for use on paper and envelopes. Equally expressive of Uncle Sam's desire not to go to extreme lengths in monopolizing terms having war-won significance is the circumstances, that for all, that the patent office has been obliged to decline to register "Liberty Bond" as a trade-mark for paper, "Liberty" for use on wrapping paper has been approved for Louis K. Mallinckrodt of Baltimore, and the Liberty Paper Company has obtained a certificate for "Liberty" for use on its tape-moistening machines. Some of our readers will, in this connection, be interested to hear that the firm of Jos. Parker & Son of New Haven, Conn., have lately obtained Government approval for the use of "Treasury" on blotting paper.

Monogram Water-marks Widely Used

The past year, for all its activity in trade-marking in the paper and pulp field, has not brought any radical change of practice in the affixing or applying of trade-marks. The water-mark continues an approved vehicle for trade-mark expression on most of the products to which it is adapted, although there has been noted an increased disposition to accomplish identification by placing a label on each package of paper and inserting in each package a top sheet bearing the mark. The continued allegiance to the water-

mark no less than trade custom is doubtless accountable for the proportion of trade-markers in the paper mart who have a special penchant for initials and monograms as "commercial autographs." Additions during the past year to the collection of alphabetical marks include the "E" of the Eastern Manufacturing Company of Bangor, Maine, and the "R & R" of Reese & Reese, of Baltimore. Byron Weston Company of Dalton, Mass., has listed with Uncle Sam the initials "B. W." in a circle as a mark for writing paper and Auer & Twitchell of Dover, Del., have made sure that their novel monogram will cover their entire line by enrolling it for use respectively on writing, printing, wrapping, toilet, and tissue paper. By the by, it may be noted just here, that such establishment of broad claims to a trade-mark is good policy on the part of any manufacturer. Indeed, it is the part of wisdom and foresight to secure the right to use a mark upon classes of paper products that are not included in the manufacturer's line at the time he makes registration, if there is any chance that he may later desire to enlarge his "family" of products or extend his production to cover the additional lines.

Restricted Trade-marks

During the past few months, a number of mystified persons in the paper trade have written to Washington to inquire "how it comes" that this or that interest in the trade is making use, attended by the warning inscription "Reg. U. S. Patent Office," of trade-marks that would seem to be outside the law. The explanation lies in the fact that a trader may secure the enrollment of a trade-mark that contains certain unregistrable features if he will, at the outset, "disclaim" any intention or ambition to monopolize those features that the rules and regulations of trade-marking insist must be kept open for the free use of all parties in the trade. The best way to illustrate how trade-marks, that are at face value seemingly ineligible, manage to get by, is to cite certain illuminating cases that have developed in recent months. For example, Alice Smith of New York secured a certificate for her trade-mark "The Jewel Bookmaker," but to do so she had to waive all claim to the word "Bookmaker" except in the connection in which it appears in that specific mark. Or again, take the case of Arrowhead Mills of Fulton, N. Y., which undertook to have Uncle Sam authenticate its mark "A. M. Fabric." The application of the Arrowhead firm was granted, but by way of prelude the concern had to agree that the registration did not confer any exclusive right to use "Fabric" on writing, wrapping, and news-print paper. Under this formula of reservations, the Duboc Paper Company had to modify its claims to "Stik-tite" appearing in its trade-mark for gummed paper for labels, and the Thames Paper Company of Purfleet, England, was given a United States certificate for its trade-mark only when it conceded that it did not pretend to be sole owner of "Airtite" as applied to cardboard.

Retailers Brand Their Goods

From the paper marketing angle, one of the most interesting trade-mark developments of the past dozen months is found in the appearance of powerful retail interests, particularly operators of chain store systems, as private branders of paper and pulp products. Private branding, so called, is, of course, legal under our trade-mark statutes because the law permits one who selects or sells goods, no less than one who makes the goods, to exercise the privileges of trade-marking. However, the manifestations now at hand show a trend the significance of which will not be lost on students of paper merchandising. The United States Drug Company of Boston, long known as a versatile trade-marker in all lines carried in its chain outlets, has paved the way for the private branding of writing paper by registering "Sorority." Parenthetically it might be added that perhaps this exemplifies a new turn of fashion in paper branding, inasmuch as the J. C. Blair Company of Huntingdon, Pa., not long ago registered "Co-Ed." Meanwhile S. S. Kresge Company of Detroit, which conducts a chain of 5 and 10-cent stores, secured at Washington the requisite documents to fortify its use on paper and envelopes of its mark, of which the letters "O X" on a representation of the globe constitute the conspicuous features.

Names Depicting Character

A sharply increased measure of ingenuity has been manifested of late in the paper and pulp industry and kindred lines in the evolution of trade-marks calculated to convey to the lay public the dominant idea of the character, purpose, or function of some of the specialties in the trade. Prominent examples of current effort to invest a trade name, with meaning suited to special circumstances, are seen in "Puzzletter," which James Maynard Williamson of Pittsburgh has picked for use on correspondence cards, and "Enveletter," which Mark Harris of New York has coined for use primarily on writing paper, but incidentally for bill heads, invoice blanks, blank checks, etc. J. H. Rand Corporation of North Tonawanda, N. Y., secured after a struggle a certificate for "Mak-ur-own" as a mark for index tabs and the Duboc Paper Company of Chicago had its wish with respect to "Addressno."

Safety papers of the class which are being recommended for use for bank checks and all manner of negotiable instruments have provided a fertile field for commercial christeners who strive to make a trade name tell its own story. A late addition to the gallery of accepted trade-marks for safety paper is "Monetized," put forward by E. E. Lloyd Paper Company of Chicago. That is a bit more meaningful, if possible, than "Hercules," accompanied by a picture

(Continued on page 1036)

Difficulties Encountered in Printing Papers

By PETER J. MASSEY
W. F. Hall Printing Company

Presented at the Meeting of the American Pulp and Paper Mill Superintendents' Association on November 7, 1919, at the Congress Hotel, Chicago

THE accompanying chart, which I have prepared for the occasion, has not been prepared with your edification in view, but rather for the purpose of taking the place of notes, and to keep me within due bounds in my discourse. As you will perceive, I have divided the "troubles" into two general groups; the Chemical and the Physical groups. The first group, which, by the way, has the least number of subdivisions, is the Chemical, and with your permission, I will endeavor to cover its subdivisions in the order of their importance, before I take up the Physical group.

Poorly Sized Papers

By poorly sized papers I do not mean the degree of sizing, such as hard or slack sized papers, but rather the papers that are not uniformly sized; paper that varies considerably in one order, in the one shipment, or, even as is sometimes the case, in the one sheet. You Paper Mill Superintendents know the conditions I refer to, and it will be unnecessary for me to explain it to you in further detail. What I will attempt to do, is to place before you, in as vivid a manner as possible, just what happens in the Pressroom when they attempt to print a paper having these characteristics, and the reasons why things happen.

When a form goes to press, the pressman will take some sheets from the pile of stock and proceed to make it ready. If the sheets he uses to make ready with are hard sized, he will prepare the make-ready accordingly, such as giving the form some extra pressure to compensate for the lighter ink film he will have to carry to prevent offset, a much flatter impression on his halftones to overcome the greater resistence of the hard surface to the halftone dots, and use a heavy bodied, tacky ink, that will dry by oxidation.

In the case of a slack sized sheet, the impression will be considerably less all over the form, but more especially upon the high lights and lighter shades of the halftones, and a soft bodied ink, with little or no tack to lift the fibers and loading material from the sheet, will be the ink used.

You can easily realize, then, that there will be considerable trouble when the sizing in one lot of paper, or in a single sheet varies to any extent. The conditions that would give perfect results in the case of a hard sized paper would be very far from the ideal requirements for a slack sized sheet. Even if a condition of this kind were known before the job went to press, it would be impossible to choose an ink and prepare a make-ready that would give good results on both papers. There would be at least some lost productive time to make the necessary change in amount of impression used, and to "doctor" or change entirely the kind of ink being used.

Hard Sized Book Papers

While a reasonable amount of sizing is desirable in all book papers, to prevent the absorption of the ink from going to the other extreme and penetrating (especially in the case of light weight papers), and to act as a binding medium for the fibres and loading material, so as to prevent the fouling of the inking rollers and form, too hard sizing is not desirable in paper for letter press printing. The same amount of sizing, that would be ideal in the case of a paper for the Offset Process, would cause considerable trouble in the letter press pressroom.

When printing on a sheet of paper, the preliminary drying or "setting" of the ink is by absorption, while the real drying or hardening is by oxidation. In the case of extremely hard sized paper, there will be practically no drying by absorption and the entire film will lay on the surface until it dries entirely by oxidation. While there are absorption compounds formed, they do not materially affect the "setting" of the ink, as it is only upon being fully oxidized that the ink will form this compound with the paper.

In very rare instances, chemical compounds are formed. How rare these instances are, and how small a fraction of all printed matter it actually is can be easily realized by the Paper Mill Superintendents present who are using waste paper as their raw material, if they will stop to consider how seldom they have met with printed paper where the fibres and ink had formed a chemical compound, and did not yield to treatment in the rotaries. Therefore, if the setting of the printing ink is through absorption or capillarity, paper containing excessive size will prevent this "setting," giving trouble with offset and necessitate the slipsheeting of the printed matter to overcome it, thereby increasing the cost of production.

Slack Sized Coated Paper

All coating mill superintendents are more or less familiar with this trouble and no doubt have had some trouble with the printer in regard to it. There have been occasions when you have shipped a lot of coated paper and expected to hear some kicking from the printer, because you knew that it was slack sized, only to be agreeably surprised to find out from your jobber that the printer had used the stock and never said a word; but that was an exceptional case. In the majority of instances, you were not disappointed, for in due time the kick came through that your paper was picking.

The subject matter to be printed is the deciding factor as to whether a slacked sized, coated sheet will get by. When the form contains no halftones or heavy solid areas, it will get by. But, as almost every instance where coated paper is used the form contains halftone illustrations, you will not get by very often with a slack sized sheet. Where the paper is to be used for color work, it is necessary that the coating be sufficiently hard sized to resist the pull of the three or four superimposed layers of the tacky ink used.

To illustrate what happens when a slack sized coated paper is delivered to the printer for a four color job, I will describe an instance of this kind that occurred not long ago in one of the largest Chicago printing plants. This printer had received a large order for four color work, the stock for which was furnished by the customer. The job was laid out, in this instance, on three presses, the yellow, the red-blue, and the black. While the yellow impression was being printed, no difficulty was experienced, but when the red-blue impression was started the paper picked very badly and both the printer and customer raised an awful howl. Owing to the large amount on this order and the scarcity of coated paper, the trouble had to be overcome somehow. It finally was by running the yellow ink as soft as possible, and with a good heavy film. When the ink was dry it acted as a sizing, and gave the coating sufficient strength to resist the pull from the impressions that followed. The loss in productive press time, exclusive of the paper wasted and the poor quality of work, amounted to over $1,200.

Acid

Free acid is a very bad ingredient for any paper, irrespective of whether it is to be used for printing purposes, as you all know how rapidly any paper will deteriorate when it contains free acid. Insofar as letterpress printing is concerned, it will not cause any trouble except in the case of colored inks. But, in lithography, both offset and stone, considerable trouble will be caused. Therefore, it is important that paper intended for lithographic purposes be free from acid. Free acid in paper is not only possible but does occur, as it did in the product of the Superintendent who did not know that the Sulphuric acid was added to release all the available chlorine, and thought that it bleached the pulp. So confirmed was he in the theory of vitriol being a bleach that when two years ago, during the shortage of bleaching powder, when his company installed a chlorine gas plant, this superintendent continued to use Sulphuric Acid and succeeded in making paper that contained a very appreciable amount of free acid. Many printers test their paper for acidity with litmus paper, and as Alum will give the same reaction with litmus, it is clearly obvious that a paper reported as containing free acid may not be acid at all.

Free Alum

In letterpress printing no deleterious effects are experienced from this source. It is the Offset printer who has difficulty with Alum, as the moisture present in this process permits the rubber blanket to carry back to the plate an alum solution that causes the grain of the plate to fill up and attract instead of repel the printing ink.

Free Alkali

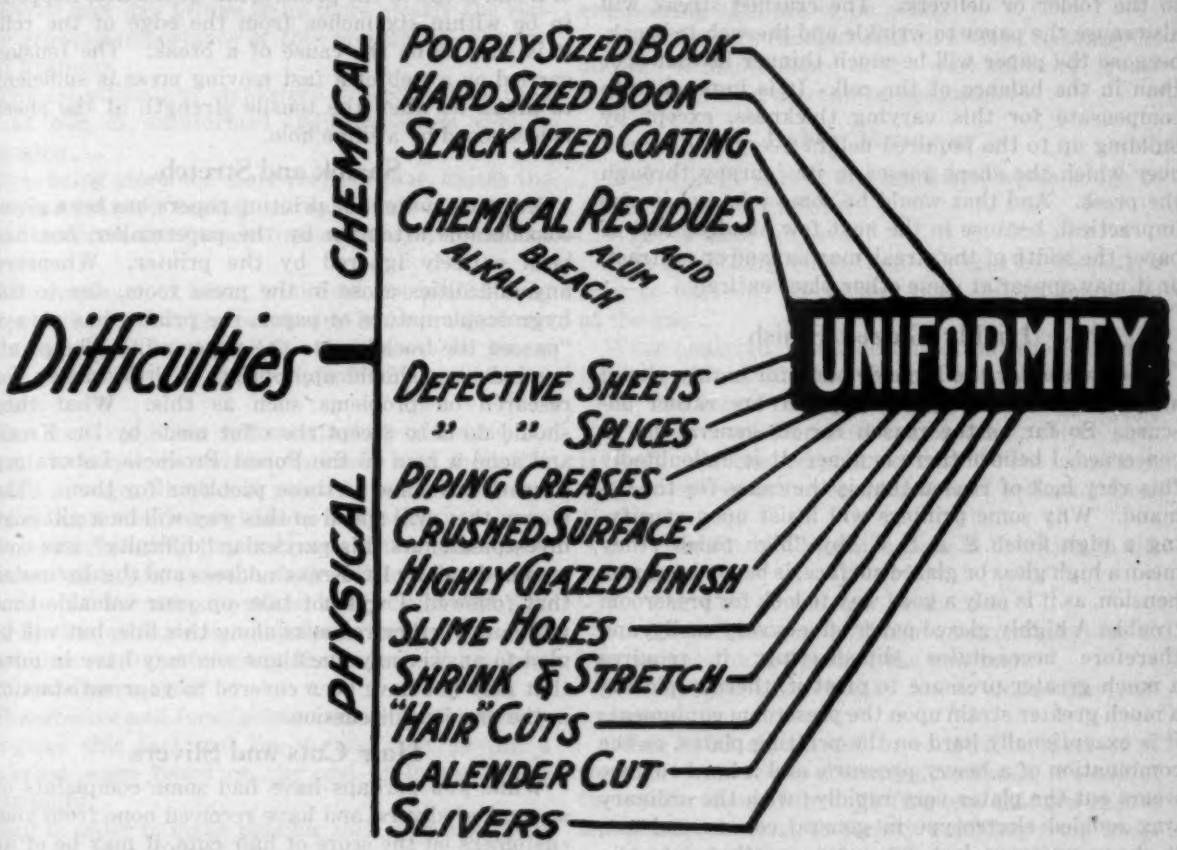
In all color printing, letterpress or lithography, alkali will give considerable trouble. As the majority of colored printing inks are analine lakes, it is obvious that trouble will be experienced, when the ink has been manufactured from an analine dye that is susceptible to alkali; the ink will also be susceptible thereto. An instance of this kind came to my notice a short time ago. Considerable difficulty was being experienced with offset and smearing of the printing, which in this case was a two-color job, orange and black, on coated stock. Upon investigation, it was found that the coated paper contained excessive alkali which neutralized the orange ink used to such an extent, that an overabundance of color was carried, so that the desired color value could be achieved in the finished print. The ink film was so heavy that it required considerable time to dry. An alkali proof ink was then substituted and no further trouble was experienced.

Defective Sheets

A serious loss in productive time on sheet fed presses is the defective sheet. While it is true that almost all sheet fed presses are now equipped with automatic feeding devices that trip the impression when a defective sheet is encountered, sheets that are torn on the end away from the guide edge, and sheets that are calender cut do not affect the tripping mechanism, and are the cause of considerable delay, to repair or replace smashed plates, and to remove from the inking rollers the loose or torn part of the sheet that has come in contact with them. In some of the larger hotbed pressrooms, a record is kept of this lost time and, where it is excessive, the mill or the customer is charged up with the loss.

Defective Splices

This is to the web press what the defective sheet is to the sheet fed press, only it is many times more serious. It is an ever recurring source of trouble to the consumer of roll paper, and is apparently due to the fact that its importance is not realized by the back tenders and third hands on the paper machines. If you have never seen what happens when a web breaks on a press running at high speed, it is very difficult for you to appreciate how important a role the poor splice plays in the web pressroom. When



the web parts at the defective splice, the loose end or tail invariably winds around the inking rollers and causes an awful mess, or it winds around the printing cylinders and smashes a few plates and the makeready. Careful study of the smaller and seemingly unimportant details of paper manufacture, such as the splices in your roll paper, will be more than compensated for by the good will that the consumers of roll paper will have for your product.

Piping Creases

The news print men have almost entirely eliminated this trouble in the last few years, but the opacity papers still have room for improvement.

While a few of the Michigan mills improved their product considerably of late, there are a number of mills that are very flagrant offenders in this matter, and who do not seem to be able to get the correct moisture content in their roll paper. One mill in particular, has received numerous complaints on this score, and has been charged back with the white waste that had to be stripped from their rolls to permit of the paper being printed at all. After "investigating" for several years, it is still shipping its paper in the same old condition. Just at this time, anything in the form of paper is saleable as the demand is much greater than the supply, but when normal conditions return, and they are bound to return some day in the near future, that particular mill is going to have hard sledding to get sufficient orders to keep moving, let alone pay dividends.

Crushed Surface

Unevenly dried paper, that has had the damp spots crushed by the calenders, is the source of considerable waste and poor quality of printing. A pressman prepares his makeready for a certain paper, an M. F. sheet for instance, and then starts up and sets his color. He adjusts the amount of ink he is carrying to the subject matter and the degree of absorption of the paper being used. If the degree of absorption, thickness, and nature of surface change, his makeready and color will no longer produce the results desired, as it is impossible to prepare either one or both so that they will be sufficiently flexible to stretch and cover any and all conditions of paper. Therefore, when a paper is being run on the press, that has crushed

spots appearing for varying lengths and widths, the pressman is kept continually busy setting his color and doctoring his makeready. The amount of ink cannot be changed instantaneously on any fraction of the machine width. The press is traveling at considerable speed, and there will be a large number of printed copies that will be off color. The fibres and loading in a crushed streak have been dehydrated and their capillarity, or power of absorption is reduced to such an extent, that the ink film will lay on the surface and smear all over the rolls leading the sheet to the folder or delivery. The crushed streak will also cause the paper to wrinkle and the web to break, because the paper will be much thinner in that spot than in the balance of the roll. It is impossible to compensate for this varying thickness, except by building up to the required height every leading roll over which the sheet passes in its journey through the press. And that would be some job, and is also impractical, because in the next few hundred feet of paper the width of the streak may expand or contract, or it may appear at some other place entirely.

Highly Glazed Finish

The causes for the large demand for highly glazed and supercalendered printing paper are rather obscure. So far as the reason for its general use is concerned, I believe there is none. It is undoubtedly this very lack of reason that is the cause for the demand. Why some printers will insist upon specifying a high finish S. & S. C., by "high finish" they mean a high gloss or glazed surface, is beyond comprehension, as it is only a good way to look for pressroom trouble. A highly glazed paper offsets very easily, and therefore necessitates slip-sheeting; it requires a much greater pressure to print it, thereby placing a much greater strain upon the pressroom equipment; it is exceptionally hard on the printing plates, as the combination of a heavy pressure, and a hard surface wears out the plates very rapidly; with the ordinary wax molded electrotype in general commercial use, it shows up every lost dot, wear, or other defect in the halftone illustrations; and with lead molded electrotypes, it exaggerates the concave type; a much more expensive ink is required to produce good results, and the production is considerably lowered in the pressroom. Why the buyers of printing demand it is even more unreasonable; true, they may be laboring under the delusion that halftone cuts cannot be printed upon any other surface, but that argument will not excuse the price lists, folders and other direct mail advertising, we receive in our mail every day, that are illustrated with zinc etchings, or contain no illustrations whatever. As Mr. Coughlin very ably stated, the buyers of printing specify highly glazed printing papers for the same reason, or want of reason, that some people buy diamonds and jewelry, because they think it gives them "class." To achieve this goal, they are willing to pay the additional costs, and destroy the vision of their prospective customers and the general reading public.

Slime Holes

Slime holes are not only objectionable because they are unsightly in appearance when incorporated with the finished printed matter and break the continuity of the reading matter, but on account of their being the cause of web breaks. While the third hand may believe that the slime hole which he lets get by won't make any difference, it may be the cause of a bad break in the pressroom. If the hole happens to be within six inches from the edge of the roll, it is sure to be the cause of a break. The tension carried on a web of a fast moving press is sufficient to break it, when the tensile strength of the sheet is weakened by a slime hole.

Shrink and Stretch

Moisture content of printing papers has been given considerable attention by the papermaker, but has been entirely ignored by the printer. Whenever any difficulties arose in the press room, due to the hygroscopic nature of paper, the printer has always "passed the buck" on to the paper mill. The printing industry should appropriate a little money for research on problems such as this. What they should do is to accept the offer made by Dr. Kress, and send a man to the Forest Products Laboratory to work out some of these problems for them. The money they will spend in this way will be a gilt edge investment. As this particular "difficulty" was covered in detail by Dr. Kress' address and the discussion that followed, I will not take up your valuable time with any further remarks along this line, but will be glad to answer any questions you may have in mind that may not have been covered to your satisfaction in the previous discussion.

Hair Cuts and Slivers

While you perhaps have had some complaints on account of slivers, and have received none from your customers on the score of hair cuts, it may be of interest to you that the result of an investigation of web breaks from "slivers" in lightweight catalog paper shows the percentage of breaks due to slivers was a very small one. The majority of "sliver" breaks were caused by wool hairs from the felts and sisal fibres from the twine used in the finishing room. By doing away with sisal twine, one mill entirely eliminated this cause of complaint.

Calendar Cuts

This form of trouble is just as troublesome in sheet paper as it is in roll papers. In sheet papers, it is the cause of lost time and press stoppage to remove parts of sheets from the inking rollers. The calendar cut weakens the sheets sufficiently to permit the form to pull the cut apart while it is being printed, and the loose end or part of the sheet not

(Continued on page 1030)

Maintenance of the Working Force

By MAURICE NEILSON

Efficiency Engineer, Belgo Canadian Pulp & Paper Co., Ltd., Shawinigan Falls, Que.

NO INTELLIGENT person, who reads the headlines of the daily papers, can fail to be impressed by the importance which is, these days, being given to the labor problem.

Every new day brings to us more clearly the rapidly growing importance of this problem in industry and business.

The old attitude of employers of labor, which used to be one of uninformed indifference, is rapidly changing.

It is being more and more realized that, unless the relations between capital and labor are harmonized and stabilized, the present industrial system cannot survive.

The employer of labor, who does not realize this, but who thinks that the perplexing labor problem can be solved merely by a reluctant increase in wages every now and then, has no longer any place in industry.

The first condition for satisfactory relations between the employer and the worker is that the latter is paid a wage, which will permit him and his family to maintain a decent standard of living.

It is not enough to pay the prevalent "market price of labor" or to pay as much as the other man, because labor is not a commodity to be bought and sold. So long as that attitude is maintained, the real cause of the universal unrest among the industrial workers will never be reached.

Progressive and foresighted managers of industry recognize this fact and the necessity of paying a minimum wage based on the cost of living in the community.

But, in order to make possible such wages without putting an increased burden on the consumer, thus anew starting the cycle of higher prices and accompanying higher wages, the manufacturing processes must be made more efficient, and production must be increased in quality as well as quantity.

Efficiency Is Knowledge Applied

Knowledge of the principles on which the manufacturing process is based; of the most efficient and economic machinery with which to carry out these processes; of scientific control of operations; of industrial research; of scientific methods of management, etc.

The services of the engineer, the industrial engineer, are required to apply this knowledge intelligently, and the managers, who do not today appreciate the need of expert knowledge, certainly belong to the minority.

But there is something more needed to achieve what is universally held out as the panacea of the present social upheavers—**production**, and that is an efficient, intelligent and satisfied working force. Without this, the best designed machinery, the highest engineering skill are of no avail.

It is therefore thought that an article, treating the subject of maintenance of the working force, would be of interest in a technical magazine.

Labor Turnover

A very large part of the industrial waste is due to excessive labor turnover.

What is labor turnover?

It is something more than the cost of keeping a man to take on "the help," that applies for a job at the gate.

When analyzed, it will be found that the following items constitute the cost of labor turnover:

1. The actual cost of engaging the workers.
2. The cost of medical examination, where such is used. Or the very large cost to the company, which may result in engaging a man suffering from disease.
3. The cost of foreman's time in breaking in the new employee.
4. The cost of reduced production.
5. The added wear and tear on machinery due to inexperience on the part of the new man.
6. The cost of accidents due to unfamiliar surroundings.

Other items should also be counted in the cost of the turnover, such as absentees, tardiness, the cost of the worker himself through frequent changes of jobs and finally the cost to society resulting from lower production, higher prices, unrest and strife.

The cost to the manufacturer due to this turnover of labor is very conservatively estimated at $50.00 per individual. If the average working force of a pulp and paper concern is taken as 1,000 men, and the number of men hired to maintain this working force—not considering seasonal increases in the personnel—is assumed to be 10 per cent per month, the number of men hired per year will be .10 x 1,000 x 12, which equals 1,200 men; 1,200 men at $50.00 per man amounts to $60,000.00 a year, which constitutes an expense well worth spending considerable effort on reducing.

Employment Management

There are two steps by which the labor turnover may be reduced. The first is care and selection in engaging the workers. The second is keeping the

worker in the organization by making him satisfied with his wages, his work, his treatment, and by making him more valuable to himself and the company through education and training.

Employment management is therefore the administration of properly centralized methods in engaging with men like himself, and that he must win their confidence through sincerity of motive and the appreciation and understanding of the other man's point of view.

The head of the employment department—employment superviser, as he is often called—should have

T. O. Form....

EMPLOYMENT DEPARTMENT

WORK ANALYSIS

Dept.	Mechanical Equipment	Nature of Work	Qualification

Fig. 1

and maintaining a competent and efficient working organization; and it is today being accepted as a necessary and important function of industrial management.

Few manufacturers have, however, as yet, well-organized employment departments. Either through ignorance or fear of introducing something new, the old system of hiring and firing is retained, and little authority in line with other department heads, and he should be responsible directly to the manager.

His work will cover study and investigation of the requirements of each occupation in the plant; the careful selection of men for these occupations; their adequate training and promotion; the fixing of just wages and the maintenance of proper working conditions; the protection of the men against undue fa-

T. O. Form....

EMPLOYMENT DEPARTMENT

WORK ANALYSIS

(Reverse side)

Name of Employee	Address	Hired	Left	Reasons for Leaving

Fig. 2

attention is, in these ages, given to the working conditions of the employees.

In order to be successful, the employment department should be in charge of a competent executive. He really can be said to take the place of the old-time resident owner, who was in close contact with and held the confidence of his employees.

He should realize that he is not dealing with a market commodity, but with the human element, tigue and accidents; the health and welfare of the employees; and finally he will provide a channel through which the employees may reach the ear of the management.

Records

For the work of the employment department, and for the compilation of statistics, records are necessary.

These can, of course, be varied to suit various con-

ditions. Those most essential are, however, given herein, and it is hoped that they will be found to be suitable for the average pulp and paper mill.

It should also be emphasized that the system of records should not be made too complicated and cumbersome. One form should be made to contain as much information as possible.

Work Analysis

The employment superviser should be familiar with the various phases of the manufacturing proc-

T. O. Form....

Hired : Not hired

EMPLOYMENT APPLICATION

Approved_____

Rate_____

Name of applicant_____ Address_____ Date to start____

Age_____ Nationality_____ Religion_____ Height_____ Weight_____

General Health_____ Chronic diseases_____ Physical defects_____

General education_____

_____

Special training_____

_____

EMPLOYMENT RECORD

Previous Employ	Address	Work	Time Employed	Date of Leaving	Wages Received

Fig. 3

esses. He should know the mechanical equipment, the qualifications of the operator and the work requirements of the different departments. For the classification and filing of this information, the form Fig. 1, may be used. The information contained on the form will be of great help in the selection of employees. On the reverse side, Fig. 2, space is provided to enter the names, addresses and other informations concerning the men filling this job.

Hiring the Man

The old way of letting the foreman hire the men, regardless of whether he has the necessary experience and qualifications, will always be expensive and unsatisfactory.

On the other hand, in some plants, the employment department does the hiring outright, and the department heads and foremen have nothing to say about it. This is hardly in keeping with democratic principles of management.

It is furthermore hardly fair to hold the foreman responsible for results with his men arbitrarily thrust on him. This is particularly true as regards skilled men, but it is believed that a better feeling is created if the foreman is given the opportunity to finally pass upon the unskilled applicants also.

The most satisfactory policy will therefore be, in the mind of the writer, to make the engagement of the worker subject to the approval of the foreman or department head. In this way, the foreman will feel that his dignity is upheld, he will be better able to keep the necessary discipline, and he will also, to a certain degree, be responsible in seeing that the man makes good.

In the case he considers that the man submitted to him by the employment department is not suitable for the job, he has to state the reason therefor fully in writing.

Space is provided for this on the introduction card, Fig. 5 described later:

Selecting the Worker

The first step in the efforts to build up a permanent working force is the selection of the right man for the job. This is particularly the case when a skilled worker is needed.

The ability to judge men, tact and common sense, in addition to familiarity with the work are essential in doing the interviewing and selecting. This should therefore be in the hand of the employment superviser and constitutes one of his most important duties. In this work, the work analysis record, described above, will be of great value.

It will probably be considered a wise policy to

require that, as far as possible, all applications are made in person. The reason for this is that, although a man may have a fair record to show, his personality may make him totally unsuited as a member of the organization in question. On the other hand, although an applicant's past record may be rather indifferent or even unfavorable, the employment superviser may find, on interviewing the man, that, with the proper training and supervision, he may promise a valuable addition to the organization.

T. O. Form....

No _____

EMPLOYMENT REQUEST

EMPLOYMENT DEPT.:

Please employ for Department No._____ Division No._____

To start work_____19 Nature of work_____

To replace_____ { Transferred / Promoted / Released }

To increase the force_____

Rate_____

Approved_____ Signed_____

Superintendent Foreman

Fig. 4

Fig. 3 shows a form used for recording information required of the applicant. This is used only in case the employment superviser considers the applicant desirable. The employment record provides space for giving the names, addresses, etc., of the last three employers.

The application forms, used by some concerns, require the answering of every conceivable question, but, in the opinion of the writer, this is to overdo a good thing.

Personality is greatly the greatest determining factor in choosing the man, and this the employment superviser will draw out during the interview.

The employment card can be made very valuable as a progress record. On the reverse side, space can be provided to enter the initial wage paid, increases in earning capacity, good or bad characteristics, absences or tardiness, etc. Report in regard to absences or tardiness is supplied by the time office.

Information concerning the worker's record of progress, on the other hand, should be given by the foreman, and it might be a good policy to provide for foremen's reports at fixed intervals.

When the application form has been filled in, the employment superviser sends the applicant to the department head or foreman, who has made the requisition (Fig. 4), together with an introduction card. Form for this card is shown in Fig. 5. In case the executive does not consider the applicant suitable, as before mentioned, he states his reasons therefor fully in the space provided on the card and then returns applicant and card to the employment department with a messenger. If he accepts the applicant, he initials the card, retains a copy and sends the original to the employment department. The employment superviser then initials the card and sends it to the time office, where it is kept as an authorized engagement.

The applicant is then given his clock number, clock card and pay check, and is now ready to become a member of the organization.

Discharge and Transfer

The autocratic power to summarily discharge a man, it is now generally recognized, is detrimental to the best interests of the company, and the temptation to fire a man on very slight provocation is very great, where such power is retained. It should also be remembered that dismissing a man unjustly does not only create ill feeling and resentment within the organization, it extends out into the community and will very quickly set up an unenviable reputation for the company.

The reputation thus created influences greatly the class of men applying for positions. As much care should therefore be exercised in allowing a man to leave the organization as was used in engaging him.

No man should be discharged or allowed to leave

before his case has been investigated by the employment superviser and the quit notice has been initialed by him in addition to the department head or foreman. If the employment superviser cannot agree with the latter in the matter of discharge, it should be submitted to the manager for decision. In this way, the worker is assured that he always will get a square deal and that his services—however humble his position may be—are a matter of great concern to his employer.

It often happens that a man shows an unfavorable progress record, and that he is unsatisfied and desires to quit, because he is not suited for his present job. In such a case an investigation by the employment superviser may help him to find a position, within the organization, for which he has a natural inclination or which is congenial to him, and he may thus be made a very valuable man to the company.

Before a man is transferred to another department, however, the matter is taken up with the respective department executives and their consent given. A new introduction card is then made out, the old card returned to the employment department, and the transfer recorded on the progress record.

It cannot be too much emphasized that the worker should be made to feel that he is always welcome to the employment superviser for advice and help. No man can give his best efforts to his work, if he is nursing grievances, or if he is having financial or other troubles in his home.

It is of as much importance to the employer as to the worker himself that he is happy and content both with his work and in his family, and the employment superviser, through tact combined with genuine interest for the man, can accomplish much to allay troubles and grievances, and to develop esprit de corps within the organization.

It is, of course, not estimated that every man engaged will turn out to become an efficient and loyal worker; there are always a certain number of men who drift from place to place, and others who are constant trouble makers.

But the great majority of men will become stable workers, if given the opportunity to develop their talents and to increase their usefulness and earning power, and particularly, if they are made to feel that their work with the organization is life work. Opportunities for professional training and education should therefore be given the workers, and this will form an important part of the employment duties.

Others, also falling within its sphere, are accident prevention work, health and hygiene, etc.

However perfect a system is organized, it will not succeed without the right spirit of co-operation and fair dealing; and, above all, it should be remembered that the worker is human material and, as such, should be given human consideration.

T. O. Form....

No. _____

INTRODUCTION CARD

Department No._____ **Division No.**_____

Employee's name_____ **Address**_____

Employed as_____ **Rate**_____ **To start work, date**_____

Approved_____ _____

Dept. Head (Foreman) **Employment Supervisor**

Department Head's (or Foreman's) Remarks:

Signed_____

Fig. 5

More Newsprint Made Than Ever Before

By R. S. KELLOGG
Secretary, Newsprint Service Bureau

NEWSPRINT production in 1919 was the heaviest ever recorded—and consumption was at least 15,000 tons greater than production, leaving not more than three days' output in the hands of the manufacturers at the end of the year.

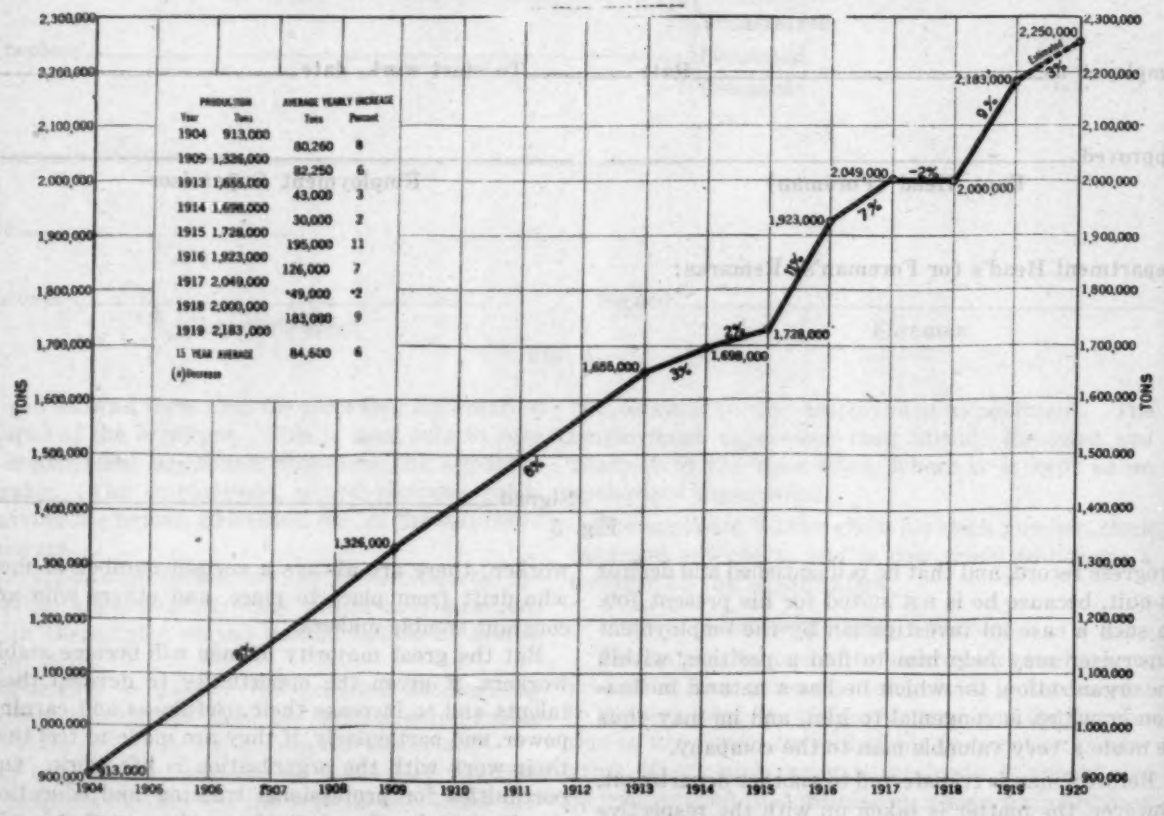
While in many other industries the plea for increased output has been little heeded, the newsprint mills will round out the year with 150,000 tons more to their credit than in 1918—and this in spite of a loss of 15,000 tons in production due to strikes early in the summer.

Three new machines came into operation during the year, one at Thorold in February, one at East Angus in July, and one at Espanola in November, making a total of nearly 7,000 tons daily capacity in the United States and Canada.

The newsprint output has followed a steadily mounting curve for many years except during the period of the late unpleasantness, when the combination of war conditions and unwise harassment of the industry held back the investment of new capital in papermaking. Once more hindsight has proved clearer than foresight, and it is now acknowledged by those who once published other views that government interference with the natural course of industry does not increase the supply of needed products.

In 1904 the production of newsprint in the United States and Canada totaled but little more than 900,000 tons. In 1919 it will amount to 2,150,000 tons. This is equivalent to an average yearly compound interest rate of increase of 6% for the last fifteen years. How long such rate of increase will continue in the future no one knows but during the next two years it will be heavy.

NEWS PRINT PRODUCTION, 1904-1920, UNITED STATES AND CANADA



New machines in process of construction or installation, to go into operation in 1920, are:

A 50-ton machine by the Escanaba Pulp & Paper Company at Escanaba, Michigan, in January, and another machine of the same size in May.

A 50-ton machine by the Spanish River Mills at Espanola in February.

A 55-ton machine by Price Brothers at Kenogami in March.

A 50-ton machine by the Manistique Pulp & Paper Company at Manistique, Michigan, in March.

A 60-ton machine by the Crown Willamette Paper Company, at West Linn, Oregon, in August.

An 85-ton machine by the Abitibi company at Iroquois Falls in September.

If these machines begin operation when planned and run continuously thereafter, they should produce approximately 65,000 tons of newsprint by the end of 1920. In addition to these new installations, the International Paper Company is temporarily turning back to newsprint three machines at Niagara Falls, with a rated capacity of 75 tons daily, which suspended operations during the war.

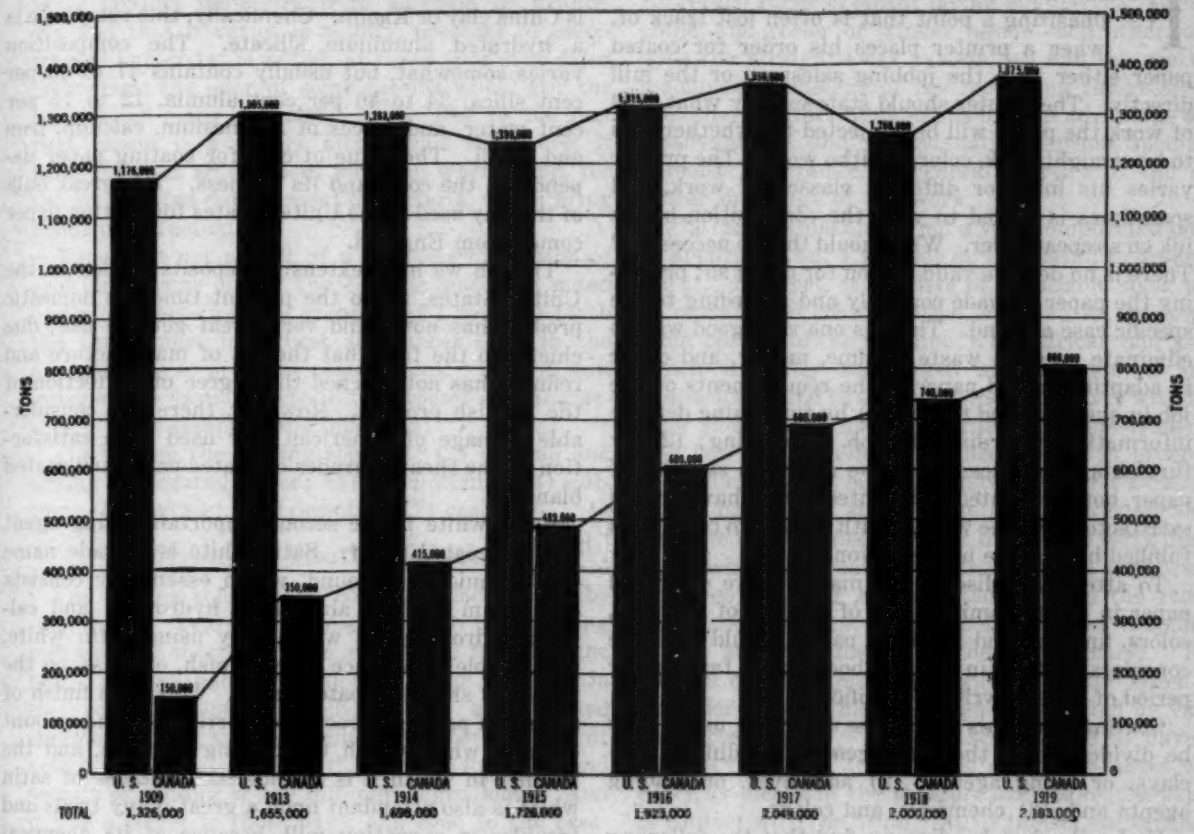
Plans already approved and being executed for 1921 call for the following additional installations:

At Grand Mere the Laurentide Company expects to bring into operation two machines with a capacity of 100 tons per day in January, 1921. Abitibi plans for a 60-ton machine to begin operations the same month. By the latter part of that year, there should be an additional 85-ton machine by Abitibi at Iroquois Falls, a new 110-ton mill by the Great Lakes Paper Company at Port Arthur, a new 200-ton mill by the International Paper Company at Three Rivers, and a new 260-ton mill by Price Bros. on the Saguenay, to be doubled in capacity at a later date.

According to these plans, therefore, by the end of 1921, new machines of approximately 1,215 tons daily capacity should be in operation. There are also rumors of other new installations that have not yet taken definite form.

What the consumption of print paper will be in the future, publishers should be able to forecast better than the manufacturers, but the supply would seem to be enough to go around before long.

NEWS PRINT PRODUCTION, 1909-1919. UNITED STATES AND CANADA



Prices for small lots of paper have recently gone to unprecedented levels in an auction market with loose tonnage snapped up by the highest bidder, because consumption exceeded production. Just now the only way for the consumer to have more paper is to use less, but situations of this kind always cure themselves if given time enough.

A very large proportion of the 1920 output is being contracted by the manufacturers at conservative and reasonable prices, when one remembers that the 50c dollar bids fair to be with us for some time to come.

With pulpwood quoted at $25 per cord, laid down at Northern New York mills, with labor costs doubled since 1916, with paper making machines costing two and a half times what they did before the war, with a ton of groundwood selling in the open market for 50% more than the former price of a ton of newsprint—what chance is there for a return to the good old days when newsprint sold at 2c a pound or less?

The Manufacture of Coated Paper

By EDWARD T. A. COUGHLIN, B.S., CH. E.
Coating Superintendent, Monarch Paper Company

Presented at the Meeting of the American Pulp and Paper Mill Superintendents' Association on November 7, 1919, at the Congress Hotel, Chicago

FIRST allow me to take a few moments in emphasizing a point that is often lost track of, when a printer places his order for coated paper either with the jobbing salesman or the mill directly. The printer should state exactly what kind of work the paper will be subjected to; whether it is to be straight book, color, or litho work. The printer varies his inks for different classes of work, and sometimes is forced to vary the composition of his ink on a repeat order. Why should this be necessary? There is no definite valid reason for doing so; providing the paper is made correctly and according to the specific case at hand. There is one very good way to eliminate needless waste of time, money, and effort in adapting coated paper to the requirements of the job in question, and that is (1) by furnishing definite information regarding the job of printing; (2) by furnishing the salesmen or the mill with samples of paper, both unprinted and printed, which have proven satisfactory for the work. With these two conditions fulfilled half of the battle is won.

To attempt to discuss the manufacture of coated paper in all its ramifications of grades, of coatings, colors, finishes, and specialty papers would consume considerable time in telling about and a far greater period of time in writing specifically.

Coating materials that have extensive usage may be divided under the three general headings: (1) clays, or filling agents; (2) adhesives, or binding agents and, (3) chemicals, and colors.

Under the first heading we find that the following substances are employed:

(1) clay—both foreign and domestic; (2) satin white; (3) talcs; (4) Blanc Fixe or Sulfate of Barium; (5) Paris white, gypsum, or calcium sulfate, or carbonate in other forms.

The second general heading will comprise: (1) casein; (2) starches in plain or modified form; (3) animal glue; (4) silicate of soda; (5) rosin sizing; (6) various forms of vegetable glues; (7) shellac.

The third general class will contain: (1) alkalis—soda ash, borax, sodium phosphate, ammonia, caustic soda, peroxide of soda; (2) oils, such as sulphonated castor and corn oils, fusil oil, or other anti-froth oils; (3) waxes, such as beeswax, canauba, Japan, stearic acid and paraffin waxes, or modifications and mixtures of one or a number to produce a special wax; (4) softeners, glycerine, glycerol, gum arabic; (5) colors, natural and chemical pigments, aniline colors of all shades and varieties.

By far the greatest single constituent material used is China clay or Kaolin. Chemically, this substance is a hydrated aluminum silicate. The composition varies somewhat, but usually contains 47 to 50 per cent silica, 34 to 40 per cent alumia, 12 to 15 per cent water, and traces of magnesium, calcium, iron and alkali. The value of clay for coating paper depends on the color and its fineness. The great bulk of the clay used in the United States for coating paper comes from England.

Though we have extensive deposits of clay in the United States, up to the present time the domestic product has not found very great general use; due chiefly to the fact that the art of manufacture and refining has not reached the degree of perfection of the English product. However, there is a considerable tonnage of American clay used with satisfaction on the cheaper grades of coated paper and coated blanks.

Satin white is the second important filling agent used in coated paper. Satin white is a trade name of a chemical compound, which essentially consists of calcium sulfate, aluminum, hydroxide, and calcium hydroxide and water. By using satin white, we are able to produce a high finish, or gloss, on the resultant sheet of coated paper. This high finish of a sheet of paper is directly proportional to the amount of satin white which the coating contains, and the manner in which it is calendered. The use of satin white is also attendant upon a great many trials and troubles in a coating mill, because of its chemical nature, and especially so when using a product which does not run strictly uniform. This is one of the many variations we meet with in our daily practice.

The third important substance used in producing a coated sheet is casein, or the binding agent. Doubtless, you all know what casein is. However, it is important enough to dwell on for a few seconds at this point. Casein is produced from cow's milk, after the butterfat has been completely removed, by precipitation with acid. It is then filtered off as a fluffy white curd, washed free from acid and dried, and later crushed and ground to the required fineness. To make a glue or an adhesive from casein, the casein, first, must be mixed with water and an alkali, or a combination of alkalies, heated to the desired temperature, and by constant mixing and stirring the coloidal solution or casein is produced. Very simple. Yes, it is, until one begins to realize what a variable substance casein may be. Milk contains

about 3 per cent casein to produce a carload of 60,000 pounds; 2,000,000 pounds or, roughly, 1,000,000 quarts of milk must be treated. This amount of milk represents the product from about 83,000 cows per day. Can you now visualize a possible variation that there may be in casein?

Large amounts of casein are produced in the United States, but not nearly enough for our consumption needs. The greatest bulk of the material comes directly from the Argentine Republic, or the same product indirectly from England or France. We find that it varies in acidity, presence of unextracted butter fat is noted; at times it is over dried or burned; the odor of some caseins would stir the inwards of many a healthy man. Due to the fact that casein is a highly nitrogenous substance, it lends itself as an excellent medium, when damp, for the growth and development of bacteria, which bring about putrefaction.

Time does not permit of a complete discussion of each and every one of the coating materials noted under the three general groups, but I have set forth the three most important substances used in the manufacture of ordinary coated stock. We will now consider the various steps in the process of manufacture. These comprise the following:

(1) Mixing the coating solution; (2) coating and drying the coated paper; (3) calendering; (4) cutting; (5) sorting; (6) trimming; (7) casing.

Mixing the Coating Solution

The coating solution or "color" is made up in the color room. Years ago, the color room of a coating mill was the most secretive spot to be found in the mill. No one had permission to enter or loiter in this room, except those chosen few who worked therein. It was an inner sanctum, a sort of "holy of holies," for here reposited the various formulae and secrets of mixing of the different ingredients. And it was a secret in those days, and even to the present time, there are some coating mills who deny free passage through their plant; and they still believe they are carrying the most precious methods in existence. Possibly it is true; who can tell? However, the modern color room is a model of efficiency in the use of the gravity system of handling the materials. In the basement or storage room, we find space that affords capacity for from one to three thousand tons of clay. On the third floor we find another large storage space sufficient to hold a six months' supply of casein, and a two or three months' supply of satin white. On this same floor is stationed the large casein size dissolving tanks, the satin white, and clay mixing tanks. The arrangement is designed so that when the clay, satin white, and casein are thoroughly mixed up, the materials may be drawn off or weighed off in the proportionate formula quantities to one large tank which will hold twenty to thirty batches, or tubs, of finished solution. From this tank, after dilution to the required density, the single tub, or batch, is again weighed or measured off; and after adding the requisite amount of coloring materials, it is then strained through a 90 mesh strainer.

Coating and Drying the Coated Paper

The solution is conveyed, either on trucks or by pumps, to the coating machines in the coating room. Coating rooms are designed along two lines; (1) return racks or lanes, (2) straight-away racks or lanes. By return racks is meant laying out the coating machine, and reeler or winder beside each other, and with the straight-away system, we find the coating machines at one end of the room, and the reeler at the other. Either method has its own advantage and disadvantages, and the installation depends upon the personal experience or general practice of the engineer in charge of the work.

The coating machine is not a very complicated piece of apparatus, but I will not go into detail in describing it. In short, it consists of a suitable color box to contain the color solution, situated in the lower front portion of the machine; a cylindrical color shell which is partly submerged in the color; a long cylindrical round brush which makes contact with the color shell ;and a long iron drum. On this drum we find two flat scrubbing brushes. Next in order is the endless rubber blanket, which serves for a carrier of the paper, and at the same time affords an ideal base for the four finishing flat brushes to work upon. The operation of coating in a few words is as follows: The web of paper is conducted between the round brush and the drum. At this point the color is applied to the sheet by means of the round brush. The amount of color applied is regulated by the speed of the color shell. This speed can be adjusted by variable speed cones. The two scrubbers also have a tendency to vary the amount of color a sheet will carry by means of the pressure exerted on the paper in contact with the drum. All of the six flat brushes, the two scrubbers, two chinas, and two badgers, stroke back and forth at right angles to the sheet of paper. The speed of the three sets of brushes are varied by step pulleys, and the length of the stroke of each is adjusted by a variable eccentric. This is necessary to remove the curved or wavy streaks that will be present in a sheet of coated paper which is not properly coated. After leaving the coating machine, the paper is conveyed by flat or round stick in continuous festoons about ten to fifteen feet in length onto the drying racks. These racks are about 180 to 250 feet in length. The paper is dried by heat radiating from coils of piping laid on the floor immediately under the loops or festoons; or in the more modern plants where attention is paid to this most salient feature of the manufacture of coated paper, we find an up-to-date, automatic ventilating, and humidifying arrangement. By the use of the latter type of drying

apparatus, we find a more naturally dried sheet of paper, which retains a sufficient percentage of moisture to enable the best results to be produced from the coating applied; a longer life is accorded the paper, a better sheet of printing paper cannot be found to approach it, everything else being equal. With the coil system of drying, an exhaust fan is necessary to remove the air heavily laden with moisture. When the paper has journeyed around the racks and comes back to the reeler or winder, it is perfectly dry and ready to be wound into reels.

Calendering

The next step in the process is the calendering of the coated sheet. By calendering is meant the producing of the finish or high gloss to the surface of the coated sheet. This is effected by conducting the web of paper through a machine called a Calender, or "Stack." This calender usually consists of four or five steel rolls, and four or five cotton rolls superimposed on each other, and is arranged in two types; (1) single finisher, and (2) double finisher. By a single finisher calender we mean a calender, the rolls of which are alternate steel and cotton, steel and cotton through the stack of seven, eight or nine rolls. In calendering a sheet of coated paper with this type of machine, all of the steel rolls come in contact with one side of the paper only, and the cotton rolls with the other, so that a duplex finish is the result. To produce an equal finish on both sides of the sheet, the paper must be put through the calender a second time. This type of calender is necessary for high grade coated paper, and is ideal for coated one side stock, such as label or lithograph paper.

But for all ordinary coated book paper, a double finisher calender is preferable. We find this type of calender to contain four steel and four cotton rolls, and two of the cotton rolls are placed together in the center of the calender. These two rolls serve to reverse the sheet of paper traveling through the machine so that an equal number of steel rolls come in contact with both sides of the paper, and thereby produce a more equal finish.

These rolls, superimposed on each other, exert a tremendous pressure by their own weight, and by a nicely balanced system of levers and weights, thousands of pounds pressure is exerted upon the sheet of paper in its passage through the machine. Inasmuch as only the bottom roll of a calender is directly driven by being coupled with a motor, there is considerable friction or inertia of the other rolls resting on one another. The friction helps to produce a gloss to the paper, and sets up a high degree of friction heat which also aids in effecting the wonderful gloss, we find in some coated paper. Calendering paper is an art in itself, and one might say that a good, first class calender man is a real artist. This part of the process of manufacture is a costly one when the power factor is given any attention. Some of the newer types of calenders are driven more economically than others, but the average calender will require from 40 to 60 H. P. motors, and the peak load of starting reaches 80 H. P. at times. Figuring a H. P. at about $70 per year, and allowing $1,000 per year for new rolls and repairs, we find that the cost approximates $5,000 per year to operate one of these calenders. The speed of calenders varies from 350 f. p. m. to 650 f. p. m. and I have seen some machines operating at 800 f. p. m.

Cutting

After being calendered, the rolls are then conveyed to the sheet cutter. This machine is designed to cut from eight to twelve rolls in one operation at a variable speed of 150 to 300 f. p. m. The cutting operation is produced by a revolving knife striking against the eight or twelve lengths of paper in contact with a stationary knife. By a suitable regulating mechanism, the speed of the revolving knife, and the speed of the squeeze of paper feed rolls are adjusted to cut a sheet of desired length. This cutting operation is continued until a pile of paper about eight to fifteen inches in height is cut off onto a sorting table.

Sorting

The paper now in sheet form on the sorting table is conveyed to the sorting room and is ready for the sorter's inspection sheet by sheet. The accustomed and trained eyes and hands of the sorters are able to detect the imperfections in the coated sheet at once, and these sheets are set aside as broke or seconds. The average amount of perfect paper produced by each trained sorter should amount to approximately 2,000 to 2,400 lbs. in nine hours, on an average base weight of 65 pounds of paper. Naturally, this stated amount will fluctuate with the size of the sheet, the weight of the sheet, and the character of the paper; i. e., whether it is high grade, or otherwise.

In an ordinary grade of coated book, the percentage of seconds will vary from 5 to 75%.

Trimming and Casing

After being sorted, the perfect paper is counted into reams by expert counters and is ready to be trimmed. This extra operation of counting is eliminated in some mills that have adopted the automatic counting machine. This machine registers each sheet, as the sorter's arm comes in contact with a lever in the action of turning the sheet from one pile to another. When 500 sheets are so registered a bell rings, and a marker or ticket is inserted in the edge of the paper, indicating one ream of perfect paper.

When the paper is sorted and counted it is then trimmed and cased. These last two operations doubtless are familiar to all of you.

Prevention of Decay in the Timber of Pulp and Paper Mill Roofs

By R. J. BLAIR, Pathologist

Forest Products Laboratories of Canada, McGill University, Montreal

(*Continued from January Number*)

An Insulated Roof

Reference to Fig. 2 shows that the ordinary type of roof fails because no provision is made to prevent the condensation in the roof itself, and the remedy for this is to build the roof in such a way that moist air entering the spaces between the planks is prevented from reaching their upper side where it is cooled to the dew-point or further. Such a result is secured when there is placed in the interior of the roof a layer consisting of at least three sheets of tar paper well mopped together with pitch. For heat-insulating purposes there is placed on top of this tar paper layer a thickness of some material which keeps it at such a temperature that if any moist air from the room reaches the paper it will not be cooled to its dew-point. Most decay begins at the upper side of the roof next the roofing paper, but if we are able to prevent moisture from reaching this point, we should be able to control the action of decay and prevent it altogether.

In making our choice for material to be used for insulation there are three points to be kept in mind. These are insulating power, cost, and a texture which will give the roof when finished a firm upper side. The material which most completely satisfies all three requirements is undoubtedly wood, and the species best suited for the purpose are cedar and redwood. Both of these woods are very light in weight and consequently are the best ones we have for insulating purposes. They are also highly resistant to the attack of fungus. If it is impossible to secure wood which is naturally resistant to decay, the next choice is timber which has been given preservative treatment.

The various insulating materials which the market offers for such work are usually of too soft a texture to be used in roofs, because there is more danger of the roof covering getting broken with resulting leaks. The commoner of these materials are cork-board, insulite and quilts made of hair, seaweed or reeds. If conditions are such that one of these materials has to be used instead of wood, the essential point is that it be kept dry. This result may be obtained by making sure that the tar paper beneath forms a layer as proof against moisture as if it had been placed on the outside of the roof exposed to the weather. If moisture once gets into any one of these materials the insulating power is destroyed and a roof insulated in such a way is worse off than if it were without insulation of any kind whatever.

For insulation, perhaps the cheapest material obtainable of all which might be used would be an inferior grade of sapwood lumber which has been given treatment with a preservative. One inch stuff is

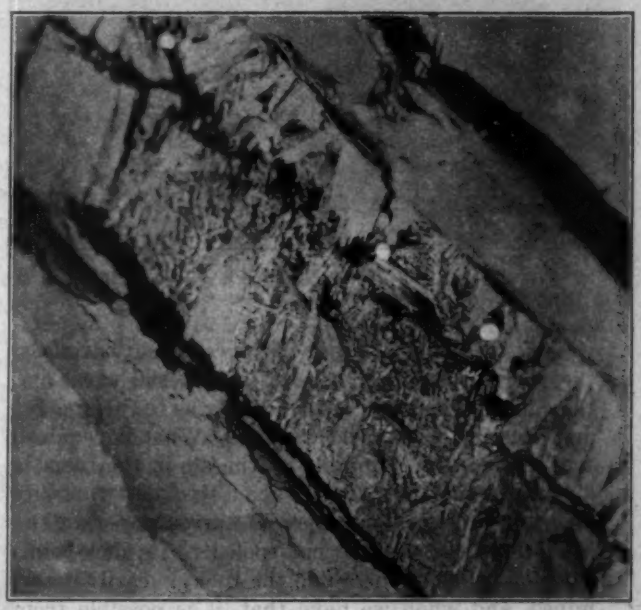


Fig. 7—Condition of the upper side of Roof Planks after a service of 5 years on a Machine Room, when exposed to cutting and folding back on the roofing paper

best suited for the purposes since it is easily handled, has more exposed surface, and is more easily treated than thicker material. Being an inferior grade of lumber, it has possibly been culled on account of incipient decay in some parts or else contains a lot of sapwood. The preservative treatment needs be but enough to kill the fungus already there and prevent another infection before the wood is put into the roof, because when once in place between the two coverings of tar paper no further infection is possible. For reasons of economy this wood may be treated at the mill with creosote. For immersing the timber in the creosote it is necessary to have a tank

with steam coils so that the oil may be heated. To carry out the treatment the oil is placed in the tank, heated and the lumber is then immersed in it for at least twelve hours, being kept hot all the time. While under treatment some of the oil will enter the wood wherever it is decayed and this along with the prolonged heating is expected to kill all the fungus in the wood, while the oil on the surface prevents any further entry of fungus before the wood is used. For these reasons the treatment described is deemed sufficient for the demands of the situation.

Amount of Insulation Required

The amount of insulating material which would have to be placed on a roof would depend upon three

Fig. 8—Sections of Roof Planks after 6 years on a Machine Room

things: the state of the air in the room as to dryness, the thermal conductivity of the material used, and the climatic condition of the locality as to the amount and severity of the cold weather. What is required is that when the humidity of the air in the room is known the roof be made of such a thickness that any air which reaches the layer of tarred paper in the interior of the roof be not cooled to its dew-point. The dew-point of the air in the room is easily determined, and when we have that, it is possible from the other given conditions to find how much insulating material must be put into the roof.

The dryness of the air in the room is controlled by the heating and ventilating system, and from the plan of these the condition of the air as to moisture should be easily determined. If this is not possible the humidity may be found by referring the readings taken with wet and dry bulb thermometers to a set of psychrometric tables. The thermal conductivity is one of the constants of any substance, and the following table lists this property for several of the commoner materials used in building construction.

The amount and severity of the cold weather is a condition which varies in different parts of the country and needs consideration when an estimate is being made as to the probable heat loss through the roof. These values will need to be secured from such local records as are available. To give an idea of what may be found in different localities, the following figures are offered. This list, which is arranged in Table 2, gives some data collected from various points in Canada and New England.

THERMAL CONDUCTIVITIES OF BUILDING MATERIALS

(From Journal of the American Society of Refrigerating Engineers.)

Material	Conductivity BTU 24 hrs.—ft. sq.—1° thickness deg. Density		Nature of Material
Air	4.		Horizontal layer, heated from above radiation eliminated.
Colorax	5.3	.064	Fluffy, finely divided mineral matter.
Hair Felt	5.9	.27	
Keystone Hair	6.5	.30	Hairfelt confined between layers of building paper.
Pure Wool	5.8	.107	Firmly packed.
Pure Wool	5.8	.102	Firmly packed.
Pure Wool	6.3	.061	Loosely packed.
Pure Wool	7.	.039	Very loosely packed.
Cotton Wool	7.	...	Firmly packed.
Insulite	7.1	.19	Pressed wood pulp—rigid; fairly strong.
Linofelt	7.2	.18	Vegetable fibers confined between layers of paper—soft and flexible.
Corkboard (pure)	7.4	.18	
Eelgrass	7.7	.25	Enclosed in burlap.
Flaxlinum	7.9	.18	Vegetable fibres—firm and flexible.
Fibrofelt	7.9	.18	Vegetable fibres—firm and flexible.
Rock Cork	8.3	.33	Pressed rock wool with binder-rigid.
Balsa Wood	8.3	.12	Very light and soft.
Waterproof Lith	9.8	.27	Rock wool, vegetable fibre and binder—not flexible..
Pulp Board	10.4	...	Stiff pasteboard.
Air Cell ½-inch	10.7	.14	Corrugated asbestos paper, enclosing air spaces.
Air Cell 1-inch	11.5	.14	Corrugated asbestos paper, enclosing air spaces.
Asbestos Paper	11.8	.50	Fairly firm, but easily broken.
Infusorial Earth	13.9	.69	(Block.)
Fire Felt (Sheet)	14.3	.42	Asbestos sheet coated with cement—rigid.
Fire Felt (roll)	15.3	.68	Soft flexible asbestos.
3-ply Regal Roofing	16.7	.88	Flexible tar roofing.
Asbestos mill board	20.2	.97	Pressed asbestos—fairly firm; easily broken.
Woods—Kiln dried:			
Cypress	16.	.46	
White Pine	19.	.50	
Mahogany	22.	.55	
Virginia Pine	23.	.55	
Oak	24.	.61	
Hard Maple	27.	.71	
Asbestos Wood (Sanded)	65.	1.97	Asbestos and cement—very hard and rigid.

TABLE 2—SEVERITY OF COLD WEATHER

Locality	Normal Snowfall in inches	Minimum Temperature	Number of days in year when temperature Between 0 & -10	Below -10
Halifax, N. S.	76.7	—17	4	Once in 2 yrs.
Quebec, P. Q.	132.9	—34	24	14
Montreal, P. Q.	122.7	—28	20	7

Toronto, Ont.	61.0	—27	7	1
Winnipeg, Man.	51.9	—54	29	56
Calgary, Alta.	46.	—49	20	25
Vancouver, B. C.	23.2	+2	0	0
Providence, R. I.	47.	—12	2	Part of day
Boston, Mass.	45.4	—14	3	"
New Bedford, Mass.	43.6	—11	1	"
Williamstown, Mass.	54.8	—26	12	3
Springfield, Mass.	58.9	—18	5	1

A Use for Bark

The situation offers the pulp mills a splendid opportunity for using up the immense quantities of bark which they have as a waste product and are often only too glad to get rid of. Bark consists largely of material of the same quality as cork which is a splendid heat-insulator. It should be possible to make the waste bark into a sheet specially suited for insulating roofs. The insulating value of such a sheet would compare very favorably with that of cork board. It is certain that if such a product were placed on the market it would find a ready sale. The question of insulation occupies a prominent place not only in the design of roofs, but also in the design of any building where artificial heating is supplied.

As it comes from the barkers, after screening to remove the very coarse particles, the bark could be easily formed into a sheet. There would be no great advantage in getting the stock reduced to a uniform consistency since spaces around the larger particles would add to the insulating value of the sheet when made. The fibrous quality of the inner bark would make it easy for the material to hold together. Bark is so abundant that any thickness of sheet could be made up affording any desired degree of insulation. The principal requirements would be to form a thick firm sheet of such a size as would permit of its ready application to the upper side of a roof.

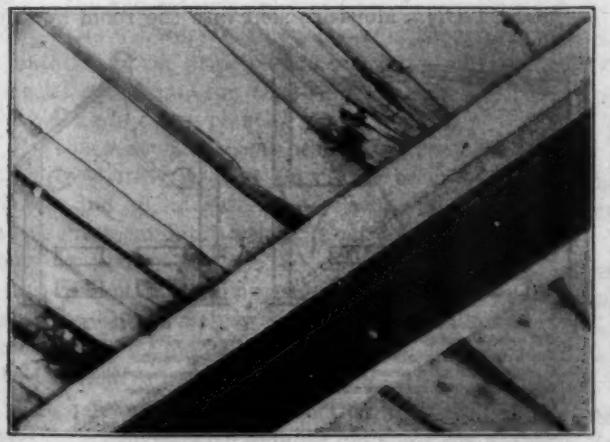


Fig. 9—Planks in roof badly rotted near the Spiking Strip

Ventilation

A great amount of decay in mill roofs may be traced to defects in the ventilating systems and very few mills have systems which could not be improved. What is needed in the ventilating system for a paper mill is something which will remove the moisture without wasting the heat supply. Good results are obtained in machine rooms where large hoods are placed over the machines to catch the steam as it comes from the dryers, these hoods being in direct connection with a large fan to carry the steam away. The sides of the hood should extend downwards as far as the top of the dryers if not further so that a

Fig. 10—Decay in the Spiking Strip of roof after 5 years' service

passing current of air carries but little of the steam out into the room. It is necessary that dry air in equal volume to that removed be supplied at the same time. These two sides of the systems in a large number of mills are very unevenly balanced. For instance, the capacity of the fans for removing moisture has been known to be three or four times that of those supplying the fresh dry air. In such a system either the exhaust fans run without carrying the amount of vapor it was intended they should, or else cold air is drawn into the mill from around the windows and other such places. A mill has been found which had a fan for ventilation but no provision had been made for the admission of air to take the place of that carried away.

In groundwood mills it is as necessary to have hoods over the grinders as it is to have them over the machines in the machine room. Very few grinder room roofs have been found in good condition and in only one mill had any attempt been made to catch the moisture coming from the grinders and carry it away.

Design of a Ventilating System

In the design of a ventilating system the first thing to receive attention is the amount of moisture which will leave the dryers. For a machine room this figure may be determined by finding the difference between the moisture of the sheet as it goes on to and leaves the dryers along with the output of the

mill for any stated interval. It is also necessary to know the amount of moisture in the air as taken into the mill. Knowing the temperatures of the air as it enters the room and as it leaves, one can find with the help of psychrometric tables what amount of moisture may possibly be carried by any volume of air. A safe margin should be held so that one does not figure upon the air leaving the mill saturated with moisture. An idea of the amounts of moisture which may be held by air at various temperatures and various degrees of saturation is given in the following table, where the data given has been selected or estimated from the complete tables contained in

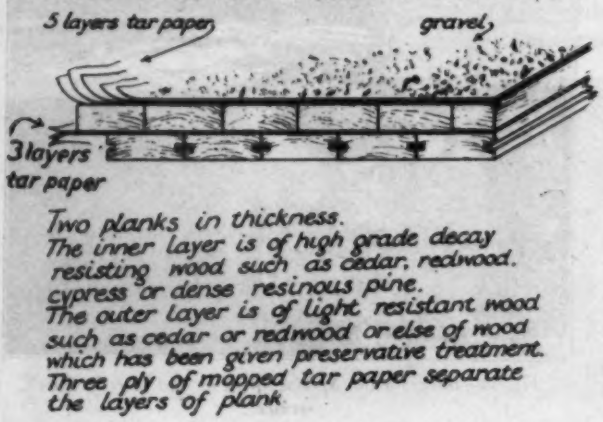

5 layers tar paper
gravel
3 layers tar paper
Two planks in thickness.
The inner layer is of high grade decay resisting wood such as cedar, redwood, cypress or dense resinous pine.
The outer layer is of light resistant wood such as cedar or redwood or else of wood which has been given preservative treatment.
Three ply of mopped tar paper separate the layers of plank

Fig. 11—Plan for an insulated roof when wood is used for insulation

"Psychrometric Tables" by C. F. Marvin, of the Weather Bureau of the United States Department of Agriculture, Government Printing Office, 1915.

TABLE 3—AMOUNTS OF MOISTURE HELD BY AIR AT DIFFERENT RELATIVE HUMIDITIES

Grains of water in suspension per cubic feet of air

Temperature F.°	Percentage of saturation 10%	40%	70%	95%	100%
—20	0.017	0.066	0.116	0.157	0.166
—20	0.028	0.114	0.200	0.270	0.285
0	0.048	0.192	0.337	0.457	0.481
10	0.078	0.310	0.543	0.736	0.776
20	0.124	0.494	0.864	1.173	1.235
30	0.194	0.774	1.354	1.836	1.935
40	0.285	1.140	1.994	2.703	2.849
50	0.408	1.630	2.853	3.870	4.076
60	0.574	2.298	4.022	5.459	5.745
70	0.798	3.192	5.586	7.578	7.980
80	1.093	4.374	7.654	10.378	10.934
90	1.479	5.916	10.353	14.045	14.790
100	1.977	7.906	13.836	18.765	19.766
110	2.611	10.445	18.278	24.806	26.112

As soon as one has determined how much moisture will be carried by any definite amount of moving air, and knowing the amount of moisture in it at the start, he can find what volume of air should pass through the system in any given time. The simplest way for finding if the ventilating system is sufficient may be noted by the presence or absence of condensation in any part of the mill, after the system has been running for some time with all doors and windows closed. The presence of any condensation would show one of two things: either that more air should be moving through the ventilating pipes, or else that it should be heated to a higher temperature. Any of these systems should be built so that the capacity may be easily regulated to correspond with varying changes of weather so that much more dry warm air may be sent into the mill on a very cold or a very moist day than on a day when the weather is moderate.

A system designed in this way should be satisfactory as regards condensation on the ceiling of the room, but it would not be sufficient to prevent condensation in concealed spaces between roof planks and the roofing paper. In all probability it would not be economically practical to attempt such a result with ventilation alone, but by following a scheme of roof construction designed especially to take care of these difficulties, the dangerous condition may be avoided. Such construction has been already discussed in connection with a heat insulting layer placed on the upper side of the planks in a roof.

A Concrete Example of Ventilating Design

Perhaps the various points involved in the design of a ventilating system can be made more clear if a concrete example were given and the following problem in this connection is offered along with its solution.

PROBLEM. How much air should be used to ventilate a machine room in a paper mill where seventy-two tons of water are evaporated by the dryers in twenty-four hours? The weather is —20°, the relative humidity is 75%, and the air used in ventilation leaves the mill at 110°.

SOLUTION. Moisture sent into the room by the

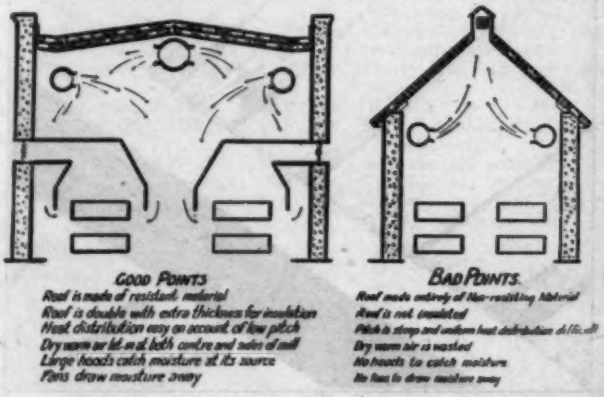

GOOD POINTS
Roof is made of resistant material
Roof is double with extra thickness for insulation
Heat distribution easy on account of low pitch
Dry warm air fed in at both centre and sides of mill
Large hoods catch moisture at its source
Fans draw moisture away
BAD POINTS.
Roof made entirely of non-resisting material
Roof is not insulated
Pitch is steep and uniform heat distribution difficult
Dry warm air is wasted
No hoods to catch moisture
No fans to draw moisture away

Fig. 12—Contrast of the good and bad points found in most paper mill roofs

dryers: 72 tons per 24 hrs. = 3 tons per hr.; i. e., 100 lbs. per minute = 700,000 grains per minute.

The fresh air at 70% relative humidity and at —20° taken in for heating and ventilating the mill

(Continued on page 1038)

The "Why" of Cost Accounting for Paper Mills

By G. J. WILLMAN
Comptroller, The Richardson Company

UNIFORM cost systems for industries is one of the most thought of subjects in the industrial world today, for the reason that there is a wide variation in quotations on a given article.

Price fixing is not only discouraged by the Government, but it is against the law. On the other hand, the Government encourages uniform cost systems for industries so that each manufacturer will know his costs and secure a fair profit. The Government's attitude would seem to indicate that in the near future a law will be passed to prevent selling below cost, which is ruinous to all the members of the industry.

The Richardson Company is a member of The National Association of Folding Box Manufacturers, The Container Club, and The Prepared Roofing & Shingle Manufacturers' Association, all of whom are working toward uniform methods of cost finding as relating to the particular industry.

The National Association of Folding Box Manufacturers started over two years ago and have the system, as devised by the Stevenson Corporation, of New York, installed in about 70 per cent of the member's plants. The last two Associations are just starting.

Much can be done in the way of uniformity as effects the general principles of Cost Accounting, but the details will vary with each plant; therefore, the application of the principles to each plant will require especial attention, for the same methods will not work alike in every plant.

For this reason, it seems best to set down the principles in writing so that they may be carefully reviewed, and all interested know what is involved in establishing an inter-locking Cost and General Accounting System.

In paper manufacturing everything hinges on the paper machine, which is the productive unit, and its accomplishment is measured in pounds of production per hour.

With a definite unit of production, the Cost System must be arranged with definite channels for gathering data and tying it up with the paper manufactured.

It is an easy matter to close a set of books at the end of the month or year and secure average ton costs for the period; but this average cost is not close enough, for parts of the production would be made at a loss, others at a very large profit, the average of all might show a fair per cent of profit until such a time as the unprofitable grades were manufactured exclusively, then the result for the period would be a loss.

Cost Elements

The are four elements of cost entering into box board, as follows: Raw Material, Labor, Machine Cost, and Burden or Overhead Expense.

Raw Material

The large item is raw material, and many economies in board manufacturing have been brought about by the use of Standard Formulas and by employing a chemist to analyze samples of raw materials, and of each run of board produced until a superior quality is obtained at the lowest cost.

When we stop to consider that with mixed papers selling for $25.00 per ton, and other raw materials running up to as high as $100.00 per ton, considerable money value is passing through the hands of the employees of the beater room with very little or no accounting for same. Clerks in the office are required to furnish very accurate accounting for all cash and it seems reasonable to suppose that materials costing considerable money should be accounted for in as accurate a manner.

A mill making 50 tons of board a day is using in the neighborhood of $1500.00 worth of raw materials, and the expense of accounting for its use is very necessary.

Labor

Inspectors for the Beater Room and Board Mill are necessary for the gathering of the data essential to a cost system.

The beater room inspector to personally supervise the loading of the Beaters from the standard formula and to keep a record of the materials used for each grade; this report is important and the basis of all material accounting.

The machine room inspector cuts samples from the board being produced each hour and inspects for the following: weight, caliber, test, speed, and percentage of moisture. He also keeps the record of pounds produced so that the reports of the beater room and machine room inspectors should check within a very small per cent on the amount of shrinkage between materials used and board produced, which is usually about 10 per cent.

Productive labor consists of standard beater and

machine crews, total cost of which is charged against grades on the hour basis. Standard crews will vary according to the size of the machine and number of beaters.

Non-productive labor consists of all labor not directly connected with production, such as engine and boiler room employees, men for loading and unloading cars, mechanics, etc. For statistical and cost accounting purposes this labor is charged to expense accounts and becomes part of the overhead or burden.

Machine Cost

A group of beaters and a paper machine represent a considerable investment and are, therefore, worthy of special treatment in cost finding.

Our plan is to consider a paper machine and the necessary beaters one unit of production, and to accumulate on a productive hour basis the cost elements which follow:

Interest on investment.
Depreciation on investment.
Repairs.

The first two items are easily figured but repairs must of necessity be estimated for a year for stabilization, otherwise large amounts spent for repairs would unduly increase costs in the month in which they occurred.

In following this plan the productive unit will show either a profit or loss on the year's operation, as actual amounts expended for repairs are charged against the unit. The profit or loss thus incurred is written off at the end of the year, but the actual repairs should be considered in setting up the estimated amount for the following year.

Burden or Overhead Expense

These may be briefly summed up as follows:

Manufacturing—
Supervision.
Indirect labor and material.
Taxes.
Insurance (fire).
Insurance (liability).
Rent.
Power, light and heat.
Repairs and upkeep.
Shipping and receiving.
Water rent.

Administrative—
Executive salaries.
Traveling.
Stationery and supplies.
Postage.
Telephones and telegrams.
Office salaries.
Legal.

Selling—
Salaries or commissions.
Traveling.
Stationery and supplies.
Postage.
Telephones and telegrams.
Advertising.
Allowance for bad debts.

There are several methods of applying expenses to product manufactured, but so complicated that the system falls of its own weight.

Manufacturing expenses should be charged on the productive hour basis, and the administrative and selling may be added if the product is shipped as fast as manufactured and there are no particular reasons for separation.

Administrative and selling expenses are usually so small a part of board manufacturing that they can be carried into costs with the manufacturing expense. Where a separation is desired, the administrative may be divided between selling and manufacturing, and the manufacturing applied as a percentage of productive labor, and the manufactured cost of goods obtained. The selling expense should then be applied as a percentage of sales. With the latter plan the monthly profit and loss sheet would show:

Sales.
Factory cost.
Factory profit.
Less selling expense.
Net profit.

The productive hour, as mentioned, means the actual running hours of the machine; the shut down hours are excluded so that all elements of cost are applied direct to the product.

To this point nothing has been touched upon but the four elements of cost which, if gathered accurately from the mill, form the foundation on which a cost system is built.

Special Forms

As each mill will vary, it is necessary to design a cost and general accounting system to fit the conditions of the particular mill, though many of the forms to be used would be the same in any mill as they are for gathering the basic information, such as production, material and labor reports.

A true cost system necessitates the closing of the books each month, so that each month's operation will be complete in itself and easily checked.

Owing to the fact that paper mills are run continuously for a week the books are easier closed in four and five week periods rather than calendar months. The period plan also allows checking of inventories, Saturday afternoons.

In order to start a complete system correctly, it is often necessary to obtain a complete appraisal of the plant departmentally in order to secure the values of plant and equipment necessary for production centers. This also makes figuring of interest and depreciation at these centers an easy matter, for interest and depreciation are as much a part of costs as labor and material.

An outline of the charts and forms necessary for

a complete system are made part of this report, but supported by forms used by The Richardson Company, and which can be applied to a paper mill as the forms affecting other lines are not presented.

They cover two felt mills, two board mills, one pasting mill, one roofing mill (with two machines), and a box factory, all of which handle through one set of books, but the basic information is accumulated on different forms for each industry.

A detailed schedule of charts and forms follows:

Chart of Accounts

PURCHASES AND THEIR TREATMENT—
- Request for quotations..... 2
- Quotations received record..... 3
- Purchase order form..... 4
- Material received report..... 5
- Invoice approved slips..... 6
- Paper stock received tally sheet..... 7
- Claim voucher 8
- Weekly inventory of raw material..... 9
- Goods in transit record..... 10
- Car record 11

FIXED AND FLOATING PROPERTY AND ITS TREATMENT—
- Machine cost record..... 12
- General stores record..... 13
- Stores requisition 14
- Beater inspector's report..... 15

MANUFACTURING—
- Board mill order forms..... 16
- Machine production report..... 17
- Tally sheet 18

EMPLOYMENT—
- Application for employment..... 19
- Application for increase in rate..... 20
- Quit notice 21
- Clock cards ....
- Time reports 22

WAGE AND PAY ROLL SYSTEMS—
- Pay roll sheet..... 23
- Office employees' record card..... 24
- Pay roll check..... 25
- Income report 26

COSTING AND COST ACCOUNTING—
- Load ticket 27
- Board production and distribution..... 28
- Material cost summary..... 29

SALES AND THEIR TREATMENT—
- Billing forms.
- Order forms.
- Order register.

SALES AND THEIR TREATMENT—Continued
- Bills of lading.
- Credit memorandum.
- Sales register.

GENERAL ACCOUNTING—
- Purchase and expense analysis.
- Cash received book.
- Check register.
- Petty cash disbursement voucher.
- Petty cash disbursement summary.
- Journal entry voucher.
- General journal.

The advantages of an accurate cost system are:

1. Knowing costs by grades it will be found that certain grades can be manufactured on given machines more economically than on others, and the grades that result in loss may be determined.
2. With the right sort of information much can be done toward more efficient operation of a mill.
3. Co-operative premium plans of wage payment can be put in force and each worker paid on the basis of what is produced.
4. The careless use of material and supplies is safeguarded in such a manner that large savings in their use are often made.
5. The management of a mill are put in possession of information that will assist them in deciding on the necessity of better working conditions, the establishing of a welfare department, the employing of medical advice to prevent accidents and sickness, the expense of which without information on costs and production looks, to many employers, like unnecessary expense.

Costs finding and its many ramifications cover a broad field and the extent to which it should be applied to a business depends on the size of the industry, as a small industry can not afford to spend as much money as a larger one. Another point that should not be overlooked is to know where system ends and red tape begins, for cost work can be analyzed to such an extent that the information secured is of very little value and may slow down production in securing it.

To install a cost system means expense and the time to start is when business is good enough to warrant the expense. The present period of good business sets the time for action and The Richardson Company will be glad to co-operate with any paper manufacturer desiring to establish a cost and general accounting system.

Average Weights of Species of Wood

In making the weight determinations given in the following table, the U. S. Forest Products Laboratory used small, clear specimens secured from the top 4 feet of the 16-foot butt logs of typical trees. Wood thus selected probably averages a trifle heavier than the wood in ordinary ties, structural timbers, poles and posts. Such large pieces usually include the pith, or are taken from top logs where relatively light weight material is frequently encountered.

Species and Locality	Weights			Species and Locality	Weights		
	Kiln-dry (1)	Air-dry (2)	Green (3)		Kiln-dry (1)	Air-dry (2)	Green (3)
	Pounds per cubic foot				Pounds per cubic foot		
Alder, red	Snohomish Co., Wash.	27	28	46	Oak, tanbark	Willits, Cal	48	44	66
Ash, blue	Harrison Co., Penn.	44	46	48	Oak, water	Vine Parish, La.	48	48	68
" black	Cattaraugus Co., Mich.	34	36	52	" white	Stone Co., Ark.	46	47	68
" "	Hamilton Co., Wis.	34	36	52	" "	Hendricks Co., Ind.	46	47	68
" blue	Bourbon Co., Ky.	38	41	56	" "	Richland Par., La.	46	49	70
" green	Richland Parish, La.	38	39	47	" "	Vine Parish, La.	46	47	68
" "	New Madrid Co., Mo.	38	40	48	" willow	Stone Co., Ark.	46	47	68
" Oregon	Linn Co., Oregon	38	40	48	" yellow	Hamilton Co., Fla.	46	48	68
" swamp	New Madrid Co., Mo.	36	37	48	" "	Morgan Co., Ind.	46	48	68
" white	Stone Co., Ark.	41	42	47	Osage orange				
" "	Oswego Co., N. Y.	44	46	61	Pecan (hickory)	Pendleton Co., Ky.	48	49	61
" "	Tuscaloosa Co., W. Va.	37	38	48	Persimmon	" " "	48	49	61
Aspen	Rusk Co., Wis.	26	27	47	Rhododendron, great	Bevier Co., Tenn.	48	48	61
" largetooth	Rusk Co., Wis.	25	27	48	Sassafras	" " "	28	28	42
Basswood	Potter Co., Pa.	24	27	41	Serviceberry	" " "	28	24	42
"	Hamilton Co., Wis.	25	25	41	Silverbell tree	" " "	28	28	44
Beech	Hendricks Co., Ind.	42	43	54	Sourwood	" " "	28	28	44
"	Potter Co., Pa.	41	43	54	Sugarberry	Pendleton Co., Ky.	28	28	44
Birch, paper	Rusk Co., Wis.	37	38	51	Sumach, staghorn	Rusk Co., Wis.	28	28	44
" sweet	Potter Co., Pa.	42	43	59	Sycamore	Hendricks Co., Ind.	28	28	44
" yellow	" " "	43	45	56	"	Bevier Co., Tenn.	28	28	44
" "	Hamilton Co., Wis.	43	44	59	Tulip tree	" " "	28	28	44
Buckeye, yellow	Bevier Co., Tenn.	28	28	40	Tupelo	St. John the Baptist Parish, La.	28	28	44
Buckthorn, cascara	Linn Co., Oregon	28	28	40	Umbrella, Fraser	Bevier Co., Tenn.	28	28	44
"	Rusk Co., Wis.	28	28	42	Walnut, black	Kentucky	37	39	56
"	Bevier Co., Tenn.	37	38	47	Willow, eastern black	Douglas Co., Oregon	28	28	42
Chestnut	Bevier Co., Tenn.	28	28	42	" "	Rusk Co., Wis.	28	28	42
Chinkapin, eastern	Linn Co., Oregon	31	32	41	" "	Pendleton Co., Ky.	28	28	42
Cottonwood	Pendleton Co., Ky.	28	28	42	" black	" " "	28	28	42
" black	Snohomish Co., Wash.	28	28	42	Witch hazel	Bevier Co., Tenn.	42	44	58
Cucumber tree	Taylor Co., Penn.	28	28	40		CONIFERS			
Dogwood (flowering)		42	44	48	Cedar, incense	Linn Co., Oregon	22	24	34
" eastern	Linn Co., Oregon	28	27	36	" "	Mead, Cal.	--	--	--
Elder, pale	Douglas Co., Oregon	28	27	36	" Port Orford	Douglas Co., Oregon	30	31	42
Elm, cork	Hamilton Co., Wis.	43	44	58	" western red	Missoula Co., Mont.	21	22	28
" slippery	Rusk Co., Wis.	43	45	54	" " "	Snohomish Co., Wash.	21	22	28
" "	Hendricks Co., Ind.	43	45	56	" white	Shawano Co., Wis.	21	21	28
" white	Rusk Co., Wis.	36	37	54	Cypress, bald	Pendleton Co., Ky.	28	28	42
" "	Jupiter Co., Pa.	33	35	48	" "	St. John the Baptist Parish, La.	28	28	42
Greenheart	Hamilton Co., Wis.	50	52	64	" yellow	Linn Co., Oregon	28	28	42
Gum, black	U. S.	30	32	45	Douglas fir	Pitkin Co., Cal.	28	28	42
" blue	Bevier Co., Tenn.	28	28	42	" "	Humboldt Co., Cal.	28	28	42
" red	Alameda Co., Cal	48	44	70	" "	Jefferson Co., Wyo.	28	28	42
" tupelo	New Madrid Co., Mo.	--	38	46	" "	Linn Co., Oregon	28	28	42
Hackberry	Pendleton Co., Ky.	34	36	54	" "	Chehalis Co., Wash.	28	28	42
"	Hendricks Co., Ind.	38	38	47	" "	Lewis Co., Wash.	28	28	42
Hemlock	Rusk Co., Wis.	28	28	42	Fir, amabilis	Washington and Oregon	28	28	42
"	" " "	28	28	42	" "	Missoula Co., Mont.	28	28	42
Hickory, big shellbark	Berlin, Miss.	47	49	63	" "	Linn Co., Oregon	--	--	--
" "	Napoleon, Ohio	48	49	63	" Alpine	Snohomish Co., Wash.	26	27	38
" bitternut	" "	47	49	63	" balsam	Grand Co., Colo.	28	28	38
" mockernut	Berlin, Miss.	47	49	64	" grand	Rusk Co., Wis.	28	28	38
" "	" "	47	49	63	" "	Missoula Co., Mont.	28	28	38
" "	Chester Co., Pa.	48	46	63	" noble	Douglas Co., Oregon	28	27	38
" "	Webster Co., W. Va.	--	--	62	" white	Multnomah Co., Oregon	27	28	38
" mockernut	Berlin, Miss.	48	48	61	Hemlock	Modoc Co., Cal.	28	28	38
" pignut	" "	48	50	62	"	Bevier Co., Tenn	28	28	38
" "	Napoleon, Ohio	51	52	64	" black	Marathon Co., Wis.	28	28	38
" "	Chester Co., Pa.	52	51	65	" western	Missoula Co., Mont.	30	28	40
" "	Webster Co., W. Va.	48	47	63	" "	Chehalis Co., Wash.	28	28	38
" shagbark	Berlin, Miss.	47	49	63	Larch, western	Gray's Harbor & Buckley, Wash.	28	28	40
" "	Napoleon, Ohio	51	54	64	" "	Missoula Co., Mont.	28	28	40
" "	Chester Co., Pa.	48	47	63	Pine, Cuban	Stevens Co., Wash.	28	28	38
" "	Webster Co., W. Va.	50	50	65	" jack	Bayou Co., Fla.	28	28	38
" water	Berlin, Miss.	54	54	69	" loblolly	Pinnes Co., Cal.	28	28	38
Holly, American	Bevier Co., Tenn.	28	28	42	" longleaf	Mason Co., Fla.	28	28	38
Hophorn	Rusk Co., Wis.	28	28	42	" ponderosa	Grand Co., Colo.	28	28	38
Laurel, California	Douglas Co., Oregon	28	28	42	" "	Gallatin Co., Mont.	28	28	38
" mountain	Bevier Co., Tenn.	47	48	62	" "	Granite Co., Mont.	28	28	38
Locust, black	" " "	48	48	62	" "	Jefferson Co., Mont.	28	28	38
" honey	Hendricks Co., Ind.	48	51	62	" "	Johnson Co., Wyo.	28	28	38
Madrone	Pendleton Co., Ky.	42	44	60	" longleaf	Mason Co., Fla.	28	28	38
"	Butte Co., Cal.	42	43	66	" "	Bogalusa, La.	28	28	38
Maple, Oregon	Douglas Co., Oregon	40	40	59	" "	Lake Charles, La.	28	28	38
" red	Snohomish Co., Wash.	28	28	42	" "	Tangipahoa Parish, La.	28	28	38
" silver	Marathon Co., Wis.	29	28	42	" "	Hattiesburg, Miss.	28	28	38
" "	Potter Co., Pa.	29	28	42	" pitch	Bevier Co., Tenn.	28	28	38
" sugar	Rusk Co., Wis.	28	28	42	" pond	Mason Co., Fla.	28	28	38
" "	Hendricks Co., Ind.	42	43	54	" Norway	Shawano Co., Wis.	28	28	38
" "	Potter Co., Pa.	42	43	54	" shortleaf	Malvern, Ark.	28	28	38
Magnolia (evergreen)	Marathon Co., Wis.	42	43	58	" "	Magnolia, La.	28	28	38
Oak, bur	Vine Parish, La.	42	44	58	" sugar	Modoc Co., Cal.	28	28	38
"	Rusk Co., Wis.	43	43	61	" Table-Mountain	Bevier Co., Tenn.	28	28	38
" California black	Butte Co., Cal.	37	39	64	" western white	Missoula Co., Mont.	28	28	38
" " "	Douglas Co., Oregon	29	30	48	" " yellow	Coconino Co., Arizona	28	28	38
" chestnut	Butte Co., Cal.	38	40	71	" " "	Modoc Co., Cal.	28	28	38
" cow	Bevier Co., Tenn.	43	45	61	" " "	Douglas Co., Colo.	28	28	38
" "	Vine Parish, La.	43	44	65	" " "	Stevens Co., Wash.	--	--	--
" Emoryi	" " "	43	45	65	" " "	Missoula Co., Mont.	28	28	38
" Gambel	Douglas Co., Oregon	43	47	65	" white	Shawano Co., Wis.	28	28	38
" live	Stone Co., Ark.	43	47	65	Redwood	Humboldt Co., Cal.	28	28	38
" Pacific post	Vine Parish, La.	43	47	65	"	Mendocino Co., Cal.	28	28	38
" red	Stone Co., Ark.	43	45	64	Spruce, Engelmann	San Miguel Co., Colo.	28	28	38
" "	Hendricks Co., Ind.	43	45	64	"	Grand Co., Colo.	28	28	38
" Spanish (lowland)	Richland Parish, La.	43	46	67	" red	Coos Co., N. H.	28	28	38
" " (highland)	Bevier Co., Tenn.	41	43	61	" "	Bevier Co., Tenn.	28	28	38
" swamp white	Vine Parish, La.	43	45	67	" Sitka	Chehalis Co., Wash.	28	28	38
" "	Hendricks Co., Ind.	46	46	64	" white	Coos Co., N. H.	28	28	38
					Tamarack	Rusk Co., Wis.	28	28	38
					Tew, western	Snohomish Co., Wash.	28	28	38

Notes.--(1) About 0 per cent moisture.
(2) About 12 or 15 per cent moisture - Average condition reached without artificial heating by material sheltered from precipitation - North Central States
(3) Freshly sawed material.

Combustion Control

By JOHN VAN BRUNT

THE economical use of coal in the boiler room is a matter that interests every one who owns or operates a boiler plant, and with the prevailing high cost of both coal and labor, and reasonable expenditure will pay a handsome dividend, always provided the expenditure is intelligently directed.

As a means of improving economy the mechanical stoker is already recognized, and is in such general use that the question I am discussing may be considered only as applying to stoker fired plants.

There are two ways in which continued efficient operation may be maintained: first, by the employment of skilled technical or trained operators, who are guided by the requisite instruments, and second, by the use of a correctly designed and applied automatic regulator, which will vary the flow of air to the stoker or the draft at the damper, and the amount of coal fed to the furnace, in accordance with the output of steam.

Operation of Regulators

This sort of regulation has seemed to be simple and easy of accomplishment. There are fan engine regulators and damper regulators galore. Many stoker manufacturers furnish such regulators with their stokers, and by continued advertising have created a demand for such regulation, so that now the average customer demands some form of automatic regulation with his stokers. In the meantime, the stoker manufacturer has found that the regulators he has been furnishing do not regulate, or in so regulating, introduce other conditions that are worse than those that were to be avoided by their use.

The average regulator in use today, although supposed to be compensating, in most cases does not function so that the air pressure is proportional to the load, but functions so that the air varies inversely to the steam pressure; and, further, it usually so operates that with a slight drop in steam pressure the throttle opens wide, and conversely closes with a slight rise in pressure. As a result, the fan runs at either the maximum or the minimum speed, neither of which corresponds to the load carried; or in the case of a natural draft stoker, the damper is either wide open or tight shut. Hence, if the average load on the boiler is 150 per cent of rating, the regulator operates to develop 200 per cent of rating for a few minutes, followed by 100 per cent of rating for a similar time, or perhaps 250 per cent part of the time and 50 per cent the rest. It is needless to point out that good efficiency is not obtainable under such conditions.

There are some combustion systems in which an attempt is made to regulate everything pertaining to combustion—draft over and under fire, feed of coal, thickness of fuel bed, etc.—nearly everything but the fireman's morals. The writer is one who believes that there are too many variables to be controlled accurately, and that any such system requires too constant skilled attention and frequent readjustment to be practiced for the average boiler plant.

What Is Needed

A reasonable degree of regulation of the air supply or boiler damper, either with or without fuel regulation, should prove of great advantage in most cases, assuming, of course, that the regulator regulates as it should, and not as most of them do. With a fairly steady load, the coal feed need not be varied for long periods, and when necessary may be adjusted by hand.

What is needed is a regulator which will function something like this: Assume a boiler plant of several boilers with forced draft stokers in which the load varies from 100 per cent to 250 per cent of rating. Assume that the air pressure required to develop 100 per cent of rating is 1 in., 150 per cent of rating 1½ in., 200 per cent of rating 2 in., or that the air pressure is directly proportional to the output of the boilers.

A regulator which will be sensitive, accurate and positive enough to pass just sufficient steam to the fan turbine, to give the air pressure required for the corresponding rating, is the one that will fill the bill. The changes in fan speed will be gradual, avoiding excessive wear and tear on the fan and turbine engine. At no time will there be more air than required for the load existing at that time, nor will there be less. The curves of rates of steam flow, coal feed and air pressure will parallel each other.

It is possible to make some of the damper regulators now in the market operate approximately as they should, but much experimenting and adjusting are necessary, all of which takes time and is expensive. The customer will not take the trouble even if he knows how to do it, and the manufacturer cannot afford to do it.

Proper Packing of Paper for Export

By R. S. CARRAWAY

ACCORDING to Department of Commerce statistics, exportations of writing paper from the United States during the first eleven months of 1919 were valued at $12,716,637, an increase of $9,648,347 over the corresponding period of 1917. Exports of wrapping paper in the first eleven months of last year were valued at $6,239,463, an increase of $2,862,038 over the same period two years ago. Exports of all kinds of paper in the first eleven months of 1919 aggregated in value $81,773,825, almost double the value of paper exported in the corresponding time of 1918 and more than double that in 1917, when paper exports were valued at $47,989,249 and $39,966, 242, respectively.

These figures are enumerated to illustrate the remarkable expansion of the United States' foreign trade in paper and to emphasize the great importance of the proper packing of paper for export. Since 1914, when the major portion of the world became embroiled in war, America's export business in paper of all kinds has grown by leaps and bounds, as the figures above show. Consumers in various corners of the world have looked to this country to supply their wants, some in part, others entirely. It can be stated without fear of contradiction that our export trade in paper has increased in proportionately larger volume than, aside from foodstuffs and possibly iron and steel manufactures, any other manufactured commodity.

Foreign Demand Increasing

During the period of the war when foreign demand for American-made paper was steadily and rapidly mounting and when exporters in this country were obtaining orders for large tonnages of paper from sources never before supplied by the United States, there were many who took a pessimistic view of the after-the-war situation and predicted that we would not be successful in holding the business acquired while hostilities in Europe were raging. These trade factors took the stand that once fighting ceased and more or less normal conditions were re-established, English, French, German and other European manufacturers of paper would regain the markets they had supplied previous to the war, thus leaving the United States out of the running in the world's trade in paper outside of her own boundaries.

Instead of decreasing, however, our exports of paper since the signing of the armistice have undergone a consistent and healthy growth. Buyers in numerous parts of the globe, having become familiar with American-made paper and having discovered that they could obtain paper in this country of as fine or better quality as that produced by European manufacturers, and frequently at cheaper prices, have continued to do their buying in the United States, with the result that American papermakers today are conducting by far a larger foreign trade in their product than they possibly ever entertained hopes of accomplishing.

Most of our export business in paper has been built up in the South and Central American countries. As is universally known, buyers in these markets are particular to an extreme degree over the manner in which the goods they purchase as packed. One of the cardinal reasons the United States never, up to recent months, assumed her rightful place in the world's trade in paper is that our manufacturers and exporters failed to give the necessary attention to the proper methods of preparing shipments for the lengthy hauls from our own seaports to foreign destinations. Since export business has become an important part of the business of the average papermaking establishment in the United States, however, paper manufacturers are devoting more attention and effort to putting up their product in the correct way for shipment outside the country. On packing depend the arrival of the goods at the station of the foreign buyer, the amount of rail and ocean freights charged for their transportation, and often the amount of customs duty that must be paid before their admission to the country of destination. It is a subject that calls for close, intelligent study, and some paper mills in the United States have gone to the trouble and expense of sending representatives to the various countries whence most of our paper exported goes to study in detail the correct methods that should be followed in packing paper for shipment to these destinations. Moreover, it can be explicitly stated that on the question of proper packing depends more than all else whether or not a large part of our foreign business in paper shall be retained.

Specifications for Packing

In packing paper for export, there are, of course, innumerable detail methods. Every manufacturer or exporter who does his own packing has some different way in which he makes up an export bale, while since the war there have been established in New York and in other seaport towns concerns whose sole business consists of packing paper and other goods for export, and these also have their different methods. The general procedure of all, however, is basically the same, and it is with this general method that we shall treat.

In the packing of flat papers, the weight of cases should not be over 500 pounds, or an absolute maxi-

mum of 600 pounds. Export cases might be subdivided into three classes; viz. (1) cases weighing 500 pounds and over up to 600 pounds, (2) cases weighing over 200 pounds and up to 500 pounds, and (3) cases weighing under 200 pounds. Cases belonging to the first class find their way principally to railway centers in most of the South and Central American republics. Cases belonging to the second class generally reach points readily accessible by motor trucks or rigs, while cases of the third class mainly find their destination carried across country from railroad towns on horse or mule back.

In making up an export bale, the paper should be laid flat on packing boards, with several layers of heavy wrapping paper in between and an outside wrapper of waterproofed paper, each ream being either wrapped individually or separated by colored strips. The paper should then be pressed in hydraulic presses and the wrappers, which protect it from dirt and dust, neatly folded around the paper prior to tightening the iron straps. The pressure should then be released and a solid compact bale, that will stand rough usage, will be turned out. It is imperative that at least one of the layers of wrappings be of waterproofed paper so that the bale will stand inclement weather or any dampness in the hold of a ship.

Packing boards are made ordinarily of spruce or pine lumber ½ inch to ¾ inch thick, and ¼ inch larger than the size of the sheet to be packed. These boards should be planed smooth on the side that faces the paper, and joined by cross slats 2 inches wide and 1½ inches thick. On these slats iron bands or straps are placed and securely fastened; these slats and straps really making the package an export bale. The iron straps or bands should not be fastened with nails driven into the wooden slats, or by twisting the ends together or by other common methods, but should be buckled securely with steel plate buckles approximately 3/32 of an inch thick, especially made for packing export bales. In order to hold the eyelets of the bands in the buckle, small pins about ¼ inch diameter and 2 inches long should be passed through the eyelets so as to cover both sides of the buckle. These bands are usually put in place and properly fastened before the pressure of the bales is completely released, so that the expansion of the bale automatically tightens the bands and the pins and buckles hold them in place.

The number of iron straps used depends on the size of the bale. The usual number of the average sized writing paper or sheet news is three or four, but when the bale is of larger dimensions, five and six straps often are required to sufficiently strengthen the bale and hold it tightly together. The iron bands are usually about one inch in width, generally received as "hoop iron" in rolls, the most satisfactory being of about 19 Imperial gauge. The hoop iron is cut into suitable lengths and each end of these lengths is formed to an eyelet shape.

The press generally used for packing papers is of the hydraulic type working under a pressure of approximately 500 pounds to the square inch. No empty space should be left inside the cases. If such empty space exists the paper is shaken about in transit, with the result that the ream wrapping (if any) is destroyed, and the paper is wrinkled and seriously damaged. When the paper is not ream wrapped the damage is ofttimes even greater.

Only the best classes of papers should be packed in cases, and then only when so instructed by the buyer. When cases are asked for they should be strongly made and should have slats at the ends similar in strength to those described for bales, passing around the top, bottom and sides. The slats should be bound further with hoop iron the same as bales and should be nailed only through to the ends and sides of the case in order to avoid damage to the contents.

Correct Marking Required

The marking of export shipments of paper, owing to the regulations governing paper imports in the South and Central American republics, is of equal importance as correctness in making up the bale. Our foreign customers require, as a rule, in addition to the size in inches, number of reams and marks, also the size in centimeters and the outside dimensions of the bale in centimeters. The gross, tare, and net weight in kilograms are frequently required to be stenciled on the bales. Scale manufacturers have put on the market scales with duplex dials giving at the same time the pounds and kilograms, thus facilitating this phase of export packing.

Some countries also require that the letters of the port of destination and other directions be of at least a certain size. Cases for Chile, for example, should be marked with letters of a minimum of two inches high. Obviously, all markings should be very distinct and such inking materials used that will not smudge or wear off.

Powdered Coal as a Fuel for Boilers

EDWARD R. WELLES and W. H. JACOBI

Part III—Furnaces

ALTHOUGH in general, furnaces are more or less special structures, and their character is determined by the service they perform, their design and type of construction depend chiefly on the nature of the fuels that are used in their operation.

The result from the combustion of fuels are gases charged with the available useful heat developed during their formation, and ash, in the case of fuels containing solid impurities. The quantity of gases and

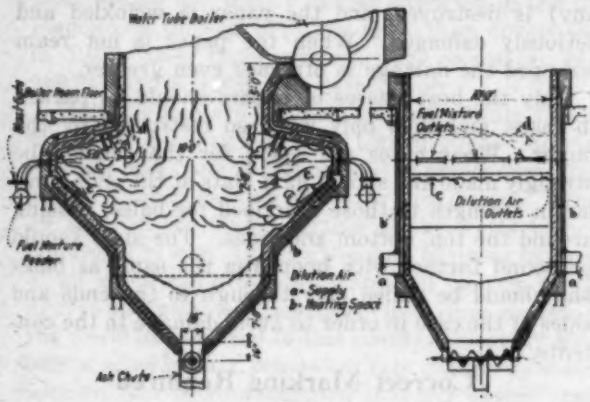


Fig. I.

their temperature depend on the quality of the fuel and the amount of air used for combustion and dilution purposes which can be varied to suit practical requirements.

In steam boiler settings the duty of both boiler and furnace is a calorific one, that is, one of straight heating, and is measured by the amount of water evaporated in the boiler by the combustion gases from one pound of fuel.

The amount of water that can be evaporated in any type of boiler by a given quantity of fuel, depends on the quality of the steam desired and the ability of the boiler to absorb the heat charge of the gases supplied by the furnace necessary for the generation of the steam required. So that, briefly stated, the boiler is subordinate to the steam requirements and the furnace subordinate to the performance of the boiler; and just so as the design of boiler is varied to satisfy the steam requirements, the furnace proportions and mode of burning coal must vary to supply the necessary gases for the efficient operation of the boiler, and in so doing, secure the greatest fuel economy.

The nature of fuels plays the all-important part in the efficiency and performance of furnaces, regardless of their calorific value.

By pulverizing and proper treatment, all grades of coals permit being dealt with on the basis of their burnable content, thereby rendering their use equally applicable to all heating services.

To demonstrate the possibilities of powdered fuel along the lines indicated, a furnace for burning efficiently all grades of coal, from the average best bituminous and anthracite qualities to lignite, such as would be applied to a water tube boiler of about 500 h.p. capacity has been designed and the results herewith given.

In working out this furnace, consideration has been given to the best features of furnaces successfully burning powdered coal and fuel oil, for a boiler with steam pressure of 175 lbs. working at 100 per cent and 200 per cent rating. The temperatures of the gases as delivered to the boiler have been assumed to be 1800 degrees F. and 2750 degrees F., respectively, for the above ratings, the boiler efficiency being taken at approximately 80 per cent in both cases.

The purpose of this design is to study the possibilities of meeting as severe demands as are made at the boiler ratings selected, using all grades of powdered fuel. Figure I shows two views of the furnace and Figure J the gas performance of three different fuels.

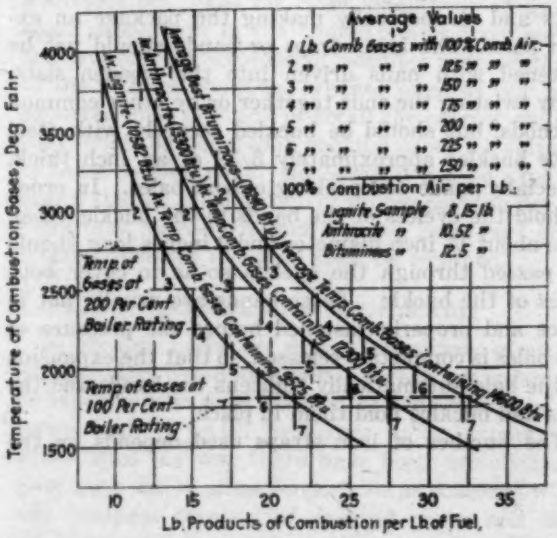

Average Values
1 Lb. Comb Gases with 100% Comb Air
2 " " " " 125 " " "
3 " " " " 150 " " "
4 " " " " 175 " " "
5 " " " " 200 " " "
6 " " " " 225 " " "
7 " " " " 250 " " "
100% Combustion Air per Lb.:
Lignite Sample 8.15 lb
Anthracite " 10.52 "
Bituminous " 12.5 "
Average Best Bituminous (13500 Btu) Air Temp
Anthracite (13500 Btu)
Lignite (10592 Btu)
Temp. of Gases at 200 Per Cent Boiler Rating
Temp of Gases at 100 Per Cent Boiler Rating
Temperature of Combustion Gases, Deg Fahr
4000
3500
3000
2500
2000
1500
10
15
20
25
30
35
Lb. Products of Combustion per Lb of Fuel.

Fig. J.

The distinctive features of this furnace are the delivery of the fuel mixture and the dilution air to insure perfect combustion, to permit regulation of

Continued on page 1034

A Smooth-finished Casting

Means much toward the economical and successful operation of your Paper Drying Machines. U. S. Cast Iron cylinder rolls are cast vertically, thereby insuring a uniform wall thickness with no unsightly seams, floating cores or chaplets—the slag rises to the top of the mold and is machined so as to leave only the pure and homogeneous metal—the result—a smooth finished casting of high quality.

All castings are made to Engineers' designs in the rough or machined. Send us your next order—we know you will be satisfied.

UNITED STATES CAST IRON PIPE AND FOUNDRY CO.

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Sales Offices

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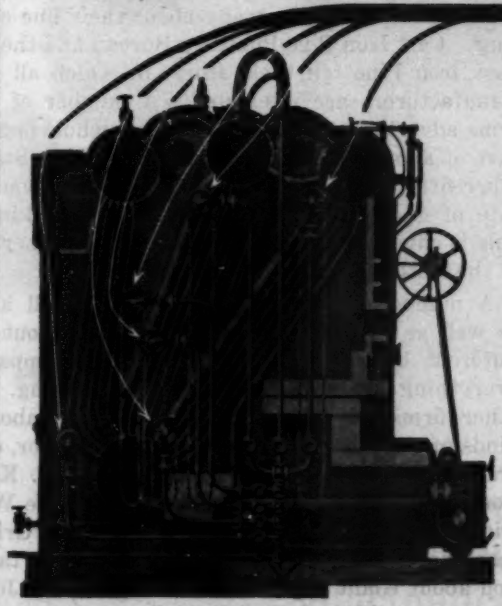
Pittsburgh—Henry W. Oliver Bldg.
New York—71 Broadway
Chicago—122 South Michigan Blvd.
St. Louis—Security Bldg.
Birmingham, Ala.—Amer. Trust Bldg.
San Francisco—Monadnock Bldg.
Buffalo—957 E. Ferry St.
Cleveland, Ohio—1150 E. 26th St.
Minneapolis—Plymouth Bldg.
Dallas, Texas, Scollard Bldg.

6 Reasons



Why this boiler is operated economically

The six reasons are the six Diamond Soot Blower units with which it is equipped. These mean—lowered coal consumption (by 4 to 8 per cent)—increased boiler efficiency and capacity—decreased use of steam for cleaning—and greatly decreased labor for cleaning.

Diamond Soot Blowers thoroughly remove all particles of soot and fine ash deposit which prevent heat transference (as an insulator soot is five times as effective as asbestos), leaving the tubes clean and free to transmit heat to the water within.

There are hundreds of successful Diamond installations in American Paper Mills. Note, for instance: Hammermill Paper, West Virginia Pulp and Paper, Bryant Paper, American Writing Paper, Neenah Paper, Neekoosa-Edwards, Rockford Box Board, Fox River Paper, Gardner Paper Board, Interlake Pulp and Paper, etc.

If your boilers are not equipped write for full information, requesting Bulletin 290.

DIAMOND POWER SPECIALTY COMPANY
Detroit, Michigan

Diamond

SOOT BLOWERS - SAVE 4 to 8% FUEL

Do You Read the Advertisements?

WE have often heard people say that in picking up magazines and papers of various kinds, they look at the advertisements first, and when asked the reason, it has often been said that these people realize that many new things are brought out in the advertising pages that are not shown in the reading pages, many things of real value to the reader. There are, no doubt, many people who have never had the habit of consistently reading the advertising pages of a magazine or their trade papers, but we are sure that it would be a very profitable thing to get into this habit. Just go over the advertising in this issue of The Paper Industry and see if you cannot find some very interesting things, just as interesting as the helpful articles in the reading pages.

For instance, on one page, you will find the advertisement of the Benjamin Electric Company. The Paper Industry has had many articles showing how to produce better lighting in the paper mills, advocating this from the point of view of better work, more satisfied employes, less eye-strain and for many other reasons. In this Benjamin Electric advertisement, they offer a book, which has a great deal of valuable information in it and ought to be in the hands of every paper mill man. In another place, you will find an advertisement of Wm. C. Nash, who has just brought out a new Shake for the Fourdrinier paper machine. This is really one of the best improvements the writer has seen added to paper machinery for many years. On another page will be seen the Green Bay Foundry and Machine Company's line of Filter and Save-alls, etc., and another the announcement of the Moore and White Company, who make a big line of paper mill machines.

On still another page will be found the announcement of the Wayne Oil Tank and Pump Company, showing how to save oil in the paper mills, and surely, this is a worthy thing. On other pages will be found the announcement of most of the wire manufacturers; and added to that is the Paper Machinery Wire Manufacturers' Industrial Council announcement, which you will no doubt be interested in. You will also find the announcements of manufacturers of all kinds of pumps and evaporating machinery. All kinds of paper is advertised in these columns. Then again, you will find the announcement of the Farnsworth Company, which tells quite a story on the saving of coal, and surely, this is interesting matter. Other pages show you the announcement of the most prominent felt and jacket manufacturers; then, likewise, the U. S. Rubber Company with their various lines. Another page shows lift-trucks by the Stuebing Truck Company; this is an exceptionally good device for paper mills. The Link-Belt Company, Brown Hoisting Company, and the John F. Byers Machine Company all announce Locomotive Cranes for handling pulp wood, coal, etc. You can read about both hand and power operated stokers. The Detroit Graphite Company shows you how you can make your plant whiter, a more healthy place to work in, all of which will help to make your employes more satisfied and do better work. The Lakewood Eng. Co. describes a new tier-lift truck, which is a remarkably good machine around paper and pulp mills.

The Aladdin Company tells you about their way of overcoming your trouble of housing your employes, how quick they can build one house or a thousand for you, and do it right; this is surely a very interesting thing to every paper manufacturer. The Portable Machine Company calls your attention to their Scoop Conveyor for the transferring of coal and other material from one place to another. There are several firms announcing continuous beaters; one telling their story about renewable fuse, and numbers of them telling you where you can get a better class of clay and all other kinds of supplies. Still another one tells you about suction rolls, and another one about the good Hamilton Engines. Four firms advertise variable speed engines, and this is a subject that is interesting to everyone. Economy Engineering Company tells you about the piling, and the Union Sulphur Company about their line of sulphur. Cast Iron Pipe Publicity Bureau and the U. S. Cast Iron Pipe tell their story, in which all paper manufacturers are interested. A number of other firms advertise valves. There is one whole page and part of another announcing water wheels. Still another firm uses a whole page to tell you about Silicate of Soda and Sulphate of Soda. All kinds of pulp is advertised, that from Finland and other parts of the world as well as the domestic article.

A number of firms advertise paper mill knives, as well as saws. Quite a number tell about their different beating engines, centrifugal pumps, and everything that you can think of needing. Still other firms tell about the Lenix Drive, about all kinds of clutches, etc., as well as paper testor, deckle frame supports, and fan systems. M. W. Kellogg Company used a page to tell you about the Welded Digesters and Tanks; another about Knife Grinding machinery, while Taylor, Stiles & Company talks to you about Giant Paper Stock Cutter. G. D. Jenssen Company tells you about Acid Systems, and droves

Continued on page 1038

An Excerpt from "Makin Paper"

...together with his family, ar... ...ir vacation in Gladstone with his ...arents.

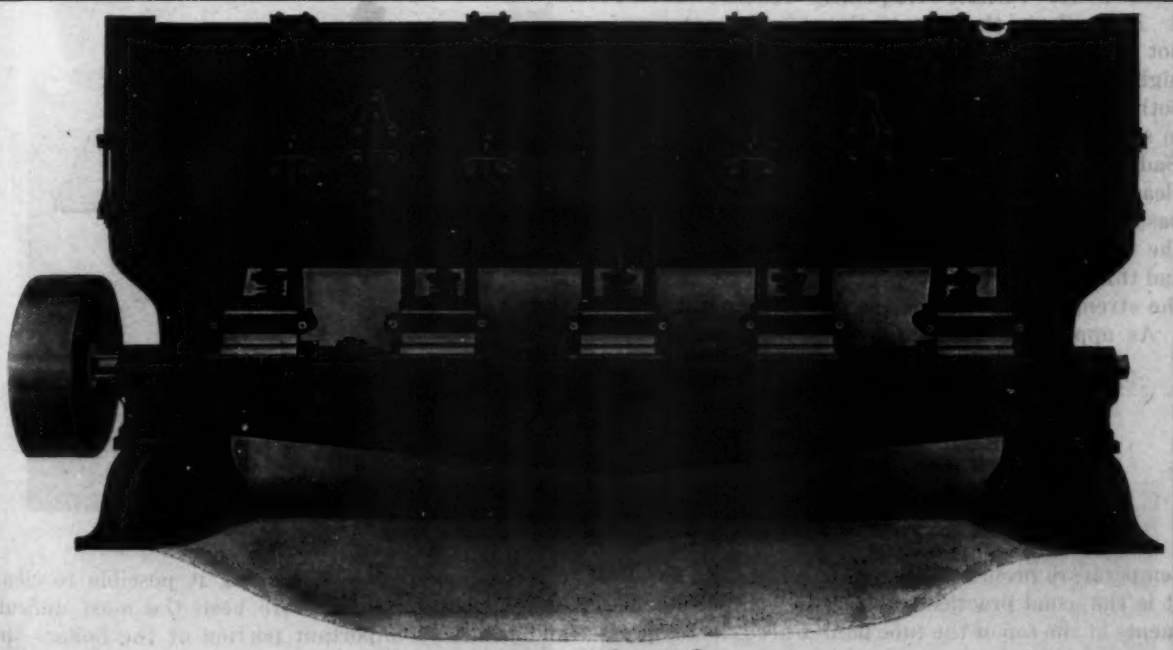
+ + +

Our No. 7 paper machine in the old Crown mill will soon blossom forth as the most up-to-date machine on the coast. A bottom suction couch roll has been in place for some months, and a suction roll has just been installed on the first press with rubber roll on top. Works fine.

L... nu... in t... T... ther... mer... five... lo... C...

The Sandusky Foundry & Machine Co.

SANDUSKY, OHIO



sneercShartle
tliuBrothers
yllacinahceMachine
tcerroCompany

Dead Gas Pockets

By WILLIAM WALKER

IN connection with their research and development work the engineers of the Vulcan Soot Cleaner Co. have brought to light some valuable and interesting information regarding the protection of soot cleaner elements by means of so-called "dead gas pockets."

Inasmuch as the temperature of combustion

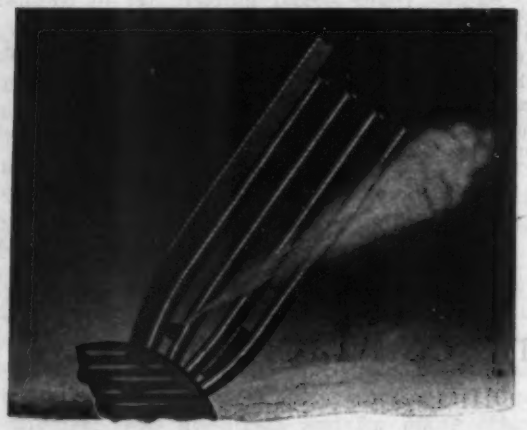


Fig. 1

in a boiler furnace frequently reached 2500°F. it is evident that soot cleaner elements cannot be placed within the immediate zone of this high temperature. Protection of some kind against both convection and radiation is necessary, especially in steep tube boilers such as the Stirling, Erie City, Badenhausen, Connelly, Ladd, etc., which require cleaner elements at the bottom and top of the first pass. The temperature at the bottom and top of the first pass is usually high, whereas in the second and third, it drops to a degree that does not influence the strength or properties of wrought iron or steel.

As applied to horizontal water tube boilers the

Fig. 2

temperature problem is seldom a serious one because it is the usual practice to place the soot cleaner elements at the top of the tube bank where the temperature seldom if ever reaches 1000°F.—a temperature that does not affect cast iron sheaths.

To fully protect the soot cleaner elements in steep tube boilers a patented deflecting baffle tile, or row of fire brick forming a pocket in which the element is operated is placed at the bottom of the first pass as shown in Fig. 1. This pocket eliminates the direct scrubbing action of the hot gases. Space is allowed at the bottom of this baffle through which soot and ash will drop during the cleaning process. The cast iron sheathing used for further covering and protecting this element is clearly illustrated in Fig. 2.

At the top of the first pass is another patented dead gas pocket in which is located the second soot

Fig. 4

cleaner element. This element, also, is further protected by means of the special cast iron sheathing shown in Fig. 3. This second element rests upon the circulating tubes close to the front drum as shown in Fig. 4. Contact with the comparatively cool tubes assists greatly in maintaining the element at a safe temperature.

By arching the baffle tile over the circulating tubes as shown, the hot gases, in their natural flow, do not come into direct contact with the element. The elements in both instances are placed in strategic and

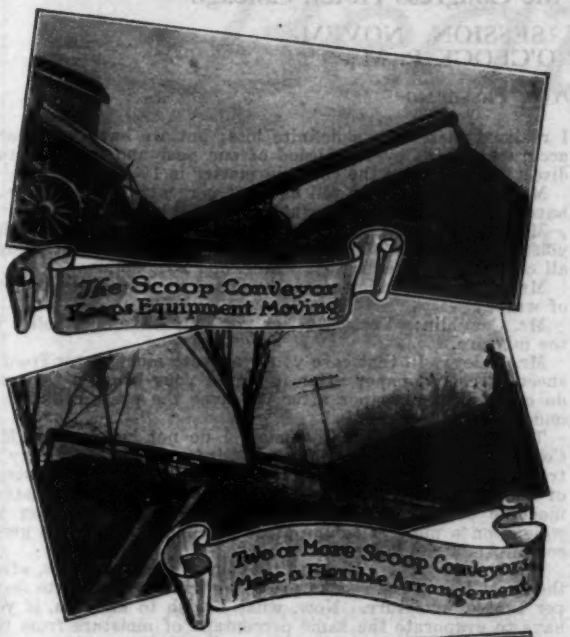
Fig. 3

commanding positions, making it possible to clean easily what has heretofore been the most difficult and the most important portion of the boiler—the first pass. It is well known that in the steep tube type of boiler, most of the steam is generated in this pass, hence the importance of keeping the first pass well cleaned.

In boilers of this type where the tubes are arranged

(Continued on page 1032)

THE SCOOP CONVEYOR



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In Storing and Reclaiming, in Loading and unloading Cars, Trucks and Wagons. It keeps equipment moving. Enables men to work faster and easier. Eliminates much shovel and wheelbarrow work. Does three to five days work in one.

The Scoop Conveyor has been adopted by over 2000 leading American manufacturers, electric railways, contractors and coal dealers because it is durable, light, compact, easily moved around and low in cost. About one-half of our sales are "repeat orders."

It is called "Scoop Conveyor" because the carrying belt receives its load over a scoop which can be pushed or completely buried into the material to be conveyed. This permits of scraping the material onto the carrying belt instead of lifting it by shovelfuls into the receiving hoppers fitted to ordinary portable belt conveyors and results in a saving of fifty per cent of the labor in feeding.

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Proceedings of the American Pulp and Paper Mill Superintendents' Association Meeting

Held on November 6-7, 1919, at the Congress Hotel, Chicago

FRIDAY AFTERNOON SESSION, NOVEMBER 7th, 1919, AT 2 O'CLOCK P. M.,

PRES. FRED C. BOYCE, PRESIDING

The President: The program for this afternoon session is a combined meeting of Printing and Paper Mill Superintendents. I am very sorry to say that the first and only disappointment in our extensive program is the first speaker scheduled for this afternoon's meeting. We have received a telegram that owing to press of business Mr. H. P. Carruth would be unable to appear, and present his paper on "The Relation of Ink and Paper to Half Tone Printing." The next speaker is Mr. Ed T. A. Coughlin who will present his paper on "The Manufacture of Coated Papers."

Now, you all know Mr. Coughlin, and it is hardly necessary for me to state that he is a good man on his subject, one of the best in the business and one of the best in our organization. Gentlemen, Mr. Coughlin.

Mr. Coughlin: Mr. Chairman and gentlemen, I must admit that our chairman here has overestimated my ability in coating paper manufacture, and hope that his wonderful introduction will not lead you to expect me to present a paper that will do the introduction justice. In fact, I owe you all an apology. I did not think it would be possible for me to attend this meeting until a few days ago, so my address will consist of a few notes that I have put together.

Mr. Coughlin then read his paper, which appears in this number.

The President: Gentlemen, are there any questions you would like to ask Mr. Coughlin on the subject of Coated Paper Manufacture? Personally, I cannot take issue with him on any of his statements as I do not know anything about it, but as there are many of you present that manufacture this particular product, I am sure that you will have something to ask Mr. Coughlin, and that he will answer your questions to your entire satisfaction.

The Secretary: Mr. President, while it may not be good policy for me to interrogate Mr. Coughlin at this time, as I am scheduled to give a little talk myself later on, and he may come back at me rather hard in retaliation, I would like to ask one question: Why do the papermakers exert so much effort and time, with the attending necessary waste, to get an excessively high finish and mirrored surface to their paper? I am sure that every pressroom executive present will agree with me when I say that you are not fulfilling any pressroom requirements by so doing, but that you do increase their troubles in addition to destroying the eyesight of the general public.

Mr. Coughlin: The highly glazed surfaces are specified by the large buyers of printing papers. Just why, I do not know, but it supposedly is for the same reason that some people buy diamonds and jewelry, because they think it gives them "class" when they buy something expensive.

Dr. Kress: I would like to ask Mr. Coughlin to tell us something about the coloring of coated paper.

Mr. Coughlin: We use, almost exclusively, analines in the dry form, which we dissolve into a liquid form by means of our own standard formula for dissolving analines and ultramarine. In the mill I am connected with, we have little matching of deep colors, as we run almost exclusively on the various tints of white, such as cream, pink, light blue and blue-white.

The Secretary: To what classes of analines are you restricted in coated papers, if you are so restricted?

Mr. Coughlin: We are confined to the basic analines.

Mr. Daley: I am interested in knowing the percentage loss on your rolls and brushes that takes place.

Mr. Coughlin: That was a question that I was very much interested in myself, when I started in the coating business. I realized there was a definite loss; but we have kept very accurate records over a period of one year and find that the direct shrinkage on the coloring matter is 1%.

Mr. Daley: Can you tell us what percentage of water you have in your coating, and what amount is evaporated?

Mr. Coughlin: It varies somewhat. With a heavy coating, you use less water. The approximate average percentage for all coating mixtures is 80% water, and 20% solids.

Mr. Daley: In other words you have to evaporate the 80% of water?

Mr. Coughlin: Yes. 80%, as you only have 20% solids in the mixture.

Mr. Daley: In that case you evaporate more water from a sheet of coated paper after it leaves your brushes than we do on a sheet of paper after it leaves the press rolls; do I understand you correctly?

The Secretary: Mr. Chairman, I do not believe that Mr. Coughlin understands exactly what information Mr. Daley is trying to get. He is trying to find out how the percentage of evaporation by weight of the entire mass on a coating machine compares with the percentage of evaporation by weight on a paper machine after the paper leaves the press rolls. Am I right, Mr. Daley?

Mr. Daley: Yes. We find that on a paper machine, after the sheet leaves the second press, we have to evaporate sixty per cent of moisture. Now, what I wish to know is, if you have to evaporate the same percentage of moisture from the total weight of paper and coating after it leaves the brushes on the coating machine.

Mr. Coughlin: The total amount of moisture evaporated is approximately 28%.

The President: Gentlemen, the next speaker is a man who needs no introduction to you, as he is known to everyone of you, Dr. Otto Kress who is in charge of the Paper Section at the Forest Products Laboratory. During this morning's session we had an address by Mr. Barth on the preservation of paper mill roofs, the fungus growths that attack the wood under certain conditions of moisture, and the toxic agents that will destroy the spores and prevent the growth of fungi. Up at the laboratory at Madison, they have a department devoted exclusively to the subject of wood preservation, where they have accumulated an enormous amount of data on this subject; not only for paper mill roofs, but also in regard to deterioration of wood pulp, pulp wood, and the spruce or other wood that you have stacked up in your wood yard, with the bark on. They have made a special study of each and every one of the various wood destroying fungi, and have them all classified. A specimen of each kind is bottled and labeled, and they are up there awaiting your inspection at any time. They also have all the various toxic agents classified as to which are the most efficient for each class of fungi and specimen of wood that has been inoculated with the spores of wood destroying fungi. Some of these have been treated with a toxic agent, and these are perfectly sound, while those that have not been so treated are in various stages of decay. In fact, they have all the information you could possibly desire on this subject, and it only costs you the slight trouble of either calling on them in person, or by mail, to make all this information available to you. They also have at this laboratory a complete equipment for making any kind of paper such as digesters, beaters, etc., a cylinder machine and a Fourdrinier machine about 18 inches wide. They are making paper in this laboratory every day of the year except Sundays, and the paper they make is of all known grades, as they experiment with every kind of pulp wood,

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There are two ways of increasing the output of your beater room.

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Chicago, Ill.

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wood pulp, and every other kind of paper making fiber. Experiments are also carried out on colors and various mixtures of furnishes. You have all had some experience experimenting in your mills and know what a wasteful game that is. You have to load up a beater of stock, color it and then run it on your machine, and then, likely as not, you will only have a lot of broke, and have to run it through all over again, lowering the production of your mill and wasting a lot of valuable time and material. Now, this work can be done at Madison without interfering with your production in any way, and with a very small fraction of the material that you would require if you did that work yourself at the mill. If you have any occasion to do any experimenting hereafter, pack up the necessary raw material, and send your superintendent with it down to Madison.

Now, this laboratory is one of Uncle Sam's institutions, he has placed it there for your special benefit, and like all government institutions, it is run and financed from Washington. If you gentlemen want Uncle Sam to support that laboratory the way it should be supported, you must let him know how much you appreciate the assistance it is giving our industry. The way to do this is to tell your congressman about it, and when the appropriation for this purpose comes up before the House, you must remind him of the fact that this laboratory is much more important to his constituents than a third-class post office in the Philippine Islands. If you do not do this, the government will not know how important this matter is to our industry, and congress will cut the appropriation down to almost nothing, as it has been doing.

This is one of the things that this organization must stand up for, if we wish to assist in advancing the interests of the whole industry. I know that the majority of you are not managers of your companies, but I also know that your word carries considerable weight with the management, and I also know that you men are all good citizens, so go to your managers and tell them why they ought to support this institution, and then take the advice that Mr. Grau gave to us yesterday; learn who your congressman is, get acquainted with him, and tell him that he must support this institution by voting it a decent appropriation in order to be able to conduct its proper functions; also tell him the reason why you want him to do this; tell him all the benefits that this big industry can derive from the laboratory, if they furnish it with sufficient funds; and that every man engaged in the industry will watch how much support he gives it, and support him in the same way. These congressmen have appropriations coming up before them continuously; they do not know whether they ought to support them or not, unless the parties that are going to be benefited by them speak up, and let them know about it. Other industries send a large delegation to Washington every time any measure comes up before congress, that directly concerns their industry, while the paper industry sits back and waits for someone else to do it for them. I wish that everyone of you superintendents here present would go and get acquainted with your congressman, as soon as you get home, and tell him how important that institution at Madison is to the paper industry. I take pleasure in introducing to you Dr. Otto Kress, the man who is in charge of the Paper Section of the laboratory, Dr. Kress. (Applause.)

Dr. Kress: Mr. Chairman and members of the Association, I cannot let this occasion go by but to thank Mr. Boyce for his very kind remarks in regard to the troubles we are experiencing at the present time as a Federal institution. Nobody is very much interested in our institution until they want something. Nobody goes down to Washington or worries whether we exist or not. I suppose I should not speak this way, but it was very kind of Mr. Boyce to say what he has, and I would like to have you feel that this is a federal institution, and it is your institution, as Mr. Boyce says, to carry on experiments. Your president has well said that to carry on experiments in the mill is very expensive. We have a completely equipped laboratory along all the various lines of wood using, and we have no axe to grind, and we are glad to be of whatever assistance we can. You can obtain certain assistance from the experimental work, and you can judge what you can do in the mill, but that is as far as we carry it.

A few days ago I returned from the east and found a very gracious invitation from Mr. Massey to attend this meeting and talk to you gentlemen on paper testing. I feel rather diffident in talking to you on paper testing, because there is nothing new I can tell you. You all know about paper testing. So instead of talking on paper testing I thought I ought to talk on a few characteristics in regard to printing paper.

Now, my sole object in coming here is to start something. I know mighty well that the printers don't know all about the paper game, and I feel quite confident that the paper men don't know all about the relation of moisture to paper, or otherwise we wouldn't have so many inquiries as we do. And it is along that line that I would like to say a few words.

(Dr. Kress then read his paper, which appears in this number.)

The Secretary: Have you any figures, Doctor, in reference to the relation of shrink and stretch of the different types of fibers?

Dr. Kress: All that I have here are these few papers, which are very few compared to the total data available. Take, for instance, on that sixty-pound kraft. In the machine direction at low humidity, 4.4 per cent, it was two per cent of stretch; 2.94% in the cross direction. Now, the interesting thing is that across the machine direction is where you get your big expansion, with high humidity; across the machine direction it jumps four per cent and in the machine direction it only jumped two to two and a half per cent.

Now, I would like to mention one thing, there, that will sound peculiar to you. One of the paper mills in Wisconsin recently shipped us some cased paper. The idea was that we were to test their boxes. We had big cylinders in there where we could put in 1,000-lb. crates, tumble them around and find out what the trouble was with the construction. These people experienced considerable difficulty in shipping to South America. Their paper was packed in the cases with the grain striking on the side of the paper. And I put it in our humidity room at 80 per cent humidity and 80° F. You can control one humidity room to within one, or one and a half per cent relative humidity. We put that box in there. I think if we had restrapped that box we would have broken the straps. We took a picture of it and the edges of that box were bowed out like this (indicating). The ends of it were not. The big expansion was practically all across the machine direction of the paper.

The Secretary: Have you any data on the relative figures of shrink and stretch and length of time in seasoning?

Dr. Kress: The length of seasoning?

The Secretary: Yes, the papers seasoned at different humidity for different periods of time.

Dr. Kress: We carried on some work on that to find out how long it would take to season paper, and I have something here on that. About two hours is what we give. We found that we could season any paper from one humidity to another in a period of two, to two and a half hours. In other words, the interesting part there was that the very highly sized papers apparently came up almost as easy as those that were more or less slack sized. That is, if you weigh a sheet of paper at one humidity, and then raise the humidity on that, and keep on weighing the paper until it reaches an equilibrium and not gain any more weight, it will require about two and a half hours. The interesting part to us was that the government bond, for instance, which is fairly high grade paper, seasoned almost as rapidly as a piece of wrapping paper. It took about two hours and a half to reach an equilibrium. So we usually hang the papers in the humidity room for three or four hours to make sure.

The Secretary: Before I ask the next question, I want to tell the printers how important that data is to them. In the first place it proves to you that paper, no matter of what description, is hygroscopic. The material it is manufactured from is hygroscopic and you can never expect the paper maker to give you a paper that will not shrink or stretch. Your atmospheric conditions in the press room are variable, therefore your paper will shrink and stretch in direct ratio to that variation; so the absolute cure is for the man who is manufacturing paper to manufacture it properly and give you as near as he can, a uniform moisture content and then the printers to have installed in their pressrooms, an air conditioning system, such as the rooms that Dr. Kress described. Then you can print under ideal conditions without any shrink and stretch.

There are several firms who have gone into this and they have found that the temperature and relative humidity that will give them the most perfect impression, and give it to them continuously without any trouble with their rollers and ink, will be about 80° Fahrenheit and 72 degrees relative humidity. Under those conditions they get the ideal printed image and a larger output.

I tried to collect all the information I could on this phase of the subject, but it is rather difficult to make this information available as this data is not given out very freely because the few printers who have adopted this system in their pressrooms look upon it as a trade secret, like the majority of the paper mills used to do on their various methods of making paper. Several of the big lithograph people in the country have also adopted that system and they are getting better work and bigger production, and get it every day in the year.

(Continued on page 1042)

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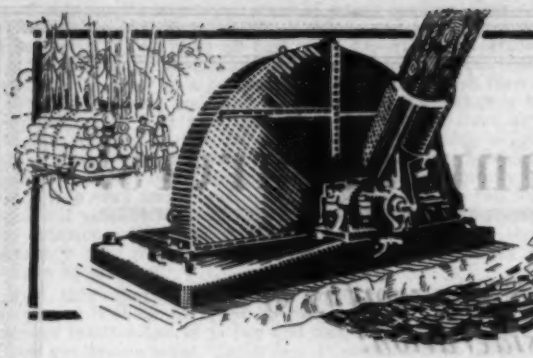
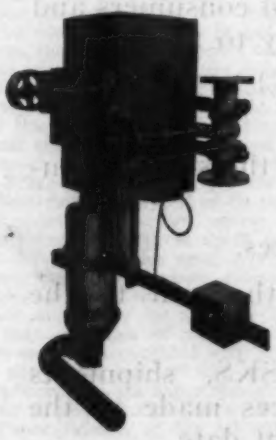


Chips of Information

The Trimbey Automatic Consistency Regulator

This is a device, as its name implies, to govern the consistency or density of paper stock, either ground wood, sulphite, soda, rag, or a combination of any of them. It is based on the well known principle that the heavier the stock the greater the head required to force the same volume of stock through a pipe.



This has been used as the basis of this Regulator, and it measures the change of friction so accurately that a change of .03 of 1% in the consistency of the stock flowing through is the difference between heavy stock and light stock as shown by it. By the placing of the weight on the scale beam, it can be set for stock of any consistency from 1.7% up to as heavy as can be pumped conveniently, and just as soon as the stock becomes heavier than that for which it is set, it automatically opens a water valve admitting water to the suction of the pump until the consistency is brought right. As the stock becomes thin, the valve is closed again. It is only necessary, when this device is being used, to make certain that the stock coming to the pump be kept as heavy or heavier, no matter how much, than that at which it is desired to have the stock delivered.

The machine was designed primarily to govern the consistency of ground wood and sulphite stock as it is supplied to beaters or mixing tanks, but it is now coming to be used extensively as a means to govern the consistency of the paper stock as it is supplied to the paper machine.

The machine itself is very simple, has no floats or valves to coat with stock and get out of order, requires only power enough to operate the water valve, and being supplied with only a sample of stock through a bi-pass from the discharge side of the pump, adds the water to the suction of the pump in such quantities as to regulate all that any pump will handle, whether it be 10 tons or 400 tons per 24 hours.

The device is no longer an experiment, there being over 60 of them now sold and in use in the United States and Canada.

A New Fourdrinier Shake

Announcement is made in this paper of a new device for paper machines, which is called an Automatic Cushion Shake for Fourdrinier machines. This device is patented and is being manufactured by Mr. W. C. Nash, superintendent of the Lakeside Paper Company, at Neenah, Wisconsin.

Mr. Nash, as is well known, has invented and patented many valuable improvements in paper making machinery, as for instance, the felt and wire guides, which are used all over the country, as well as the Hubard & Nash Deckle Frame Support, and a number of other devices.

This new Shake is an altogether different proposition from anything that has heretofore been used on Fourdrinier machines. The Shake on the machine can be changed without stopping the machine, and simply, by the moving of the governor valve, so that the Shake can be made just as soft as is wished by the operator. With this device, the operator naturally will make his changes whenever it is necessery, for the reason that it can be done so easily.

This Shake has as near a continuous motion as can possibly be made; it furnishes a soft and uniform throw; will not buckle the tube rolls from the jar: it will cause the fiber to carry a larger per cent of filler by a more densed sheet, and this alone is very

The LENIX Drive

¶ THE LENIX is a mechanical device scientifically applied to belt drives for the purpose of giving large arcs of contact between belt and pulleys, and automatically increasing or decreasing from such arcs in proportion to the variation in the power transmitted.

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important, as more and more clay will no doubt be used in making paper.

By this device, a smoother and more uniform sheet of paper can be obtained; the Shake can be adjusted while in motion to suit the condition of the stock without any waste of paper; it is easy on the machinery and neat in appearance. Already many mills have ordered this device, because they realize that this is valuable to them and, we believe, is a good thing to have. We are sure it would be profitable to any paper mill man who is running a Fourdrinier machine to get in touch with Mr. Nash. The motive power in this device is air and works in the form of a cushion, so it is more easily handled than by present methods.

Device to Remove Drain Obstructions

A valuable device for removing obstructions in sewers, pipes and drains has been invented by John T. Burns, a workman employed by the Department of Sewers of New York City. The "Victory" Self-Propelling Nozzle, shown in the accompanying illustration, works very much like a sky-rocket. As the rocket is forced upward into the air by the explosives shooting downward, so this is propelled forward by the action of the water coming out backward from the larger holes in the rear of the nozzle, as all of the water cannot be forced through the front bore.

There are three important points accomplished in its construction. First, the nozzle propels itself and drags the hose a long distance in the sewer or pipe to the obstruction; second, it loosens a small portion of the obstruction at a time without jamming the same; and third, the loosened portion of the obstruction is washed out backward to the opening of the sewer or pipe.

By attaching the nozzle to a ten or twenty-foot 1½-inch iron pipe and the pipe coupled to a fire hose, fires in coal bins or in rooms where chemicals are stored can be readily extinguished.

The manufacturers are Sidney Sladden & Co. of New York City.

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Stopping Leaks in Hydraulic Gates

By L. W. WYSS

Considerable water can be saved by stopping the leaks in a dam, and at many installations where all the water is used this leakage is equivalent to wasting many tons of coal during a year. Stopping the small leaks at the sides and bottoms of gates can be accomplished best with cinders. Sometimes special spouts must be made to guide the cinders to the leaks when obstructions prevent dropping the cinders directly above the leaks. Chips from waterlogged wood will also sink slowly and stop leaks. When using cinders in a forebay near where small pipe intakes, such as for transformer-cooling water, etc., are located, it is well to close the valves temporarily or the pipes may be clogged.

Effect of Decay on Paper-Making Qualities of Wood Pulp

Clean groundwood pulp and pulp infected with molds and fungi have been used in recent comparative paper-making trials at the Forest Products Laboratory, Madison, Wisconsin. These trials showed that infected pulp was inferior to clean pulp in the following respects:

The infected pulp produced a very dirty sheet.

It required more sizing than the clean pulp.

It stuck to the couch and press rolls and gave trouble from excessive foaming.

Although groundwood pulp is usually considered too slow, the extreme freeness of the infected pulp caused difficulty in carrying the necessary amount of water on the paper machine to secure a good formation in the finished paper.

Based on the percentage of groundwood, the infected pulp, used on the experiments, yielded 10 per cent less finished paper, than the clean pulp.

The strength of the finished paper was greatly reduced by the use of infected pulp. In a groundwood sulphite furnish, this decrease in strength would necessitate the use of a larger percentage of the more expensive sulphite pulp.

Determining Active Strength of Sulphate Cooking Liquor

Experiments at the Forest Products Laboratory, Madison, Wisconsin, on sulphate cooking liquor indicate that the action of NaOH is substantially twice as drastic as that of Na_2S between the ration of 1 part NaOH to 1 part Na_2S and 4 parts of NaOH to 1 part Na_2S.

The active strength of the cooking solution in terms of NaOH is expressed by the equation

$$S = M + N/2$$

where S is the active strength of the solution, M the

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The classy edition (who said "classic"?) of "A Further Palaver on Paper", just finished by the Roycrofters for us, shoots a lot of interesting dope on KVP—not full of holes either—including some observations of an "outsider" on labor conditions at the mill. Most of the boys and girls out here work with us and not for us, which helps put KVP quality into such of our paper as you use.

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concentration of NaOH, N the concentration of Na_2S.

A rapid method of determining the strength of a cooking solution is as follows:

Add 10 cc. of cooking liquor to about 50 cc. of water in a porcelain dish. Add 10 cc. of a saturated solution of $BaCl_2$. Stir vigorously, and titrate with normal hydrochloric acid to phenolphthalein end point. The number of cubic centimeters is directly proportional to the strength.

This method is the most convenient for use in the digester house, because of its simplicity and the fact that it does not involve a consideration of the ratio of NaOH to Na_2S.

Difficulties Encountered in Printing Papers

(Continued from page 992)

held by the grippers is carried by the form onto the inking rollers. In roll papers, it causes the same inconveniences as does the imperfect splice, the hair cut, or sliver, as it invariably causes a web break wherever it occurs.

While these deficiencies are by no means the only ones encountered in the printing of paper, they are, however, the most important ones. I do not wish to convey the impression that paper manufacture is more open to criticism than any other industry, such as for instance the printing industry, for that is not my thought. I know that the paper maker is by far the more perfect of the two.

What I have attempted to do, however, is to place before you some of the troubles that the printer has with your product in such a manner that you may realize the importance of these seemingly trivial defects in your paper, when it is being used in the pressroom. Trivial is the right word, for I do not believe there is one of these troubles that you could not, or have not already, eliminated when its relative importance has been called to your attention. In what measure I have been successful, is for you to judge.

In conclusion, I wish to say that, in paper as in any other commodity, there is one factor that cannot be overlooked if you expect your product to reach the enviable position so well described by Mr. Mericle, and that is uniformity.

If your product is uniform, there will be little or no complaint from the consumer. The printer, by the use of the proper ink and the correct adjustment of his press, can meet the requirements of almost any stock. He can print on waterproof coated paper, and water leaf paper, on paper that is strongly acid or strongly alkaline; there are ways and means for him to overcome all these difficulties but there are no means at his disposal, whereby he may overcome two or more of them in one lot of paper. The ink and makeready that will be suitable for a hard sized sheet will not be suitable for a slack sized sheet. Any change in surface, sizing, or thickness will necessi-

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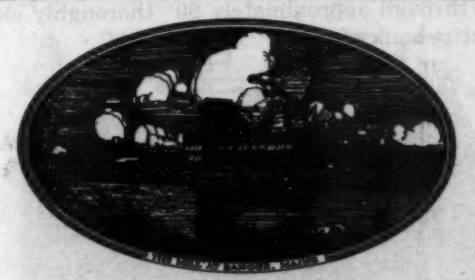

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tate some change in the pressroom technic. Therefore, any paper that will have the same peculiarities, and in the same degree throughout any one shipment, will be the one most favored by the printer, because its uniformity will permit him to print the entire run without changing either his ink or equipment. A good illustration of this is seen in one of the leading magazines. The body of this book is printed in one color, black, on a rotary web press and is a fairly hard sized sheet, while the cover stock, printed in two colors, is slack sized; just the opposite to what would be expected. Yet, they achieve some wonderful results with this arrangement, because both the body and cover stock are always uniform and have been running so for years without appreciable variation.

There is one pressroom difficulty that you cannot overcome, and that is shrink and stretch, although a paper with uniform moisture content will assist somewhat in its alleviation. The solution of this problem, which is entirely up to the printer, will be of very material assistance to both industries.

Dead Gas Pockets

(*Continued from page* 1018)

in squares, perpendicular nozzles are used as shown in Figs. 2 and 4. That is, the nozzle makes a right angle with the axis of the element, hence the jet is directed between the tubes. With a nozzle blowing into every space, rotation of each element in Figs. 1 and 3 through approximately 90° thoroughly cleans the entire bank of tubes.

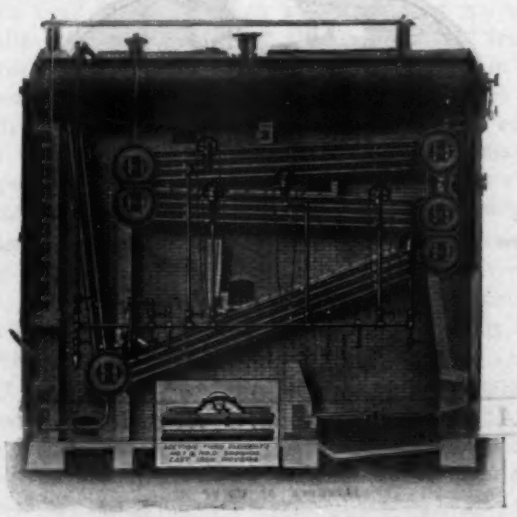
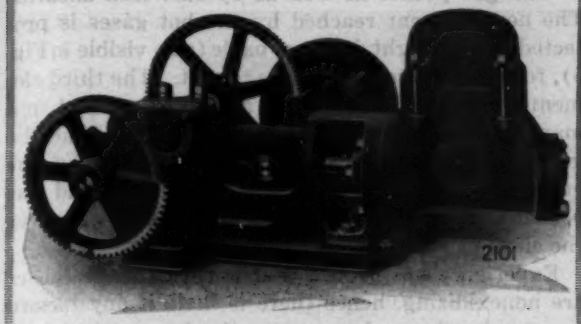


Fig. 5

In the Vogt boiler there is a departure from conventional horizontal water tube boiler design, making it necessary to place two of the elements closer to the high temperature zone, as illustrated in Fig. 5. Hence the element No. 1, which is closest to the hot burning gases and glowing fuel bed, is protected by



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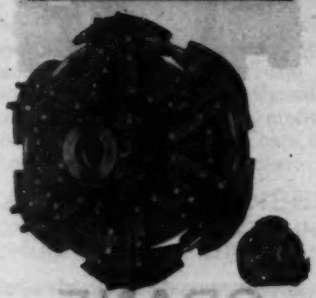

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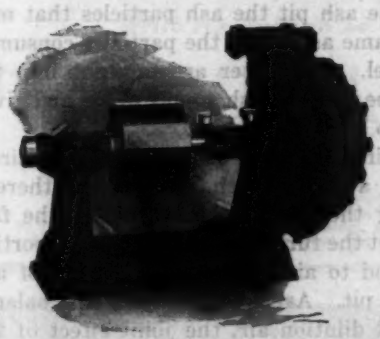
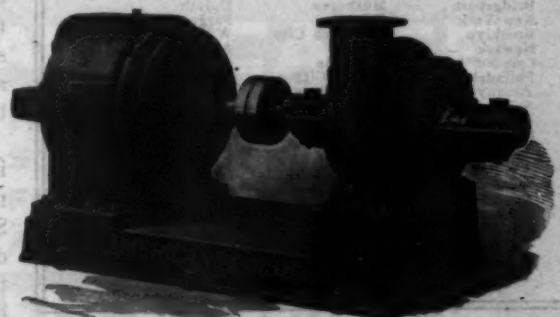


Extra wide ring oiled bearings. Overhanging casing allowing the discharge to be taken at any angle desired. Removable outer head so that impeller may be withdrawn without disturbing the casing. Hydraulically balanced impeller insuring minimum end thrust. Impeller machined all over and turned to make a close running fit with the casing.

Finished with open runner for handling paper stock.

INVESTIGATE. ASK FOR BULLETIN No. 25.
Furnished Promptly Upon Request.

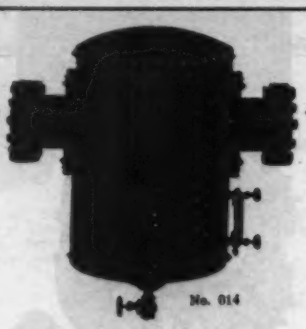


We Also Manufacture **Power Pumps, Deep Well Pumps, Boiler Feed Pumps, Vacuum Pumps, Horizontal Power Air Compressors.**

American Steam Pump Co.

Battle Creek, Michigan

Chicago Office, 1220 Monadnock Block.
New York Office, Whitehall Building, 17 Battery Place.



CRANE

EXTRA HEAVY

Steam Separators

have large areas and ample baffle surfaces, affording the highest degree of efficiency with the slightest loss in pressure. Their design is based upon the most approved mechanical and scientific principles.

We do not hesitate to offer this superior line of Separators in competition with any Steam or Oil Separating devices on the market. Fully described in our Catalogue No. 50, which will be sent upon request.

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a dead gas pocket as well as by cast iron sheaths. The next element reached by the hot gases is protected by a straight diagonal baffle (also visible in Fig. 5), forming a second dead gas pocket. The third element reached is protected by a dead gas pocket in a manner similar to element No. 1. By the time the gases reach element No. 4 the temperature of the gases has dropped sufficiently so that a dead gas pocket is not necessary, nor is it necessary to cover the element with cast iron sheaths.

Experience has proved that burned furnace gases are nonoxidizing, hence there is little if any hazard in exposing bare elements to the low temperature gases. The high temperature problem is as a rule of greater importance than the corrosion problem, but this has been effectively solved by these investigators by means of combined dead gas pocket protection, cast iron sheaths, and contact with the comparatively cool boiler tubes.

Powdered Coal as a Fuel for Bailers

(*Continued from page* 1014)

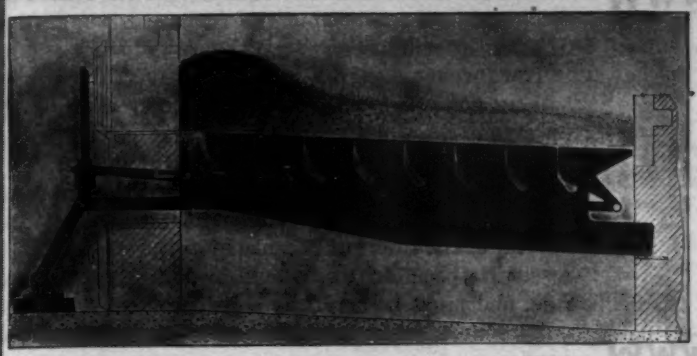
the fire and to guard against the slagging and destructive difficulties heretofore encountered. The air is supplied by suitable blowers and is heated before use by the waste flue gases for fuel mixing and by the body of the furnace for dilution purposes.

Regulation is accomplished by control of the fuel and of the air, the fuel mixture spout outlets being proportioned to deliver, at maximum duty, a mixture containing 75 per cent of the air required for perfect combustion.

The purpose of the air jets under the flame is to blow toward the ash pit the ash particles that may fall from the flame as well as the partially consumed particles of fuel. The latter are brought into the deflagration zone with a fresh supply of air and given a new chance to burn completely.

The row of air jets on top of the flame is to direct the flame over a longer path and provide thereby longer time for the complete oxidation of the fuel particles, protect the furnace from the hottest portion of the flame and to aid in the precipitation of ash toward the ash pit. Aside of supplying the balance combustion and dilution air, the joint effect of the two rows of air jets is to carry the flame in suspension, away from the furnace walls and the ash deposit, and fulfill thereby one of the chief requirements for burning powdered coal.

The idea of precipitating the ash by rapidly expanding the flame into a large space is applied, but it is not expected that all the ash can be thus collected. Some of the ash dust will be carried by the gases and deposited on the boiler tubes and surfaces beyond the hearth and must be blown off occasionally by soot blowers to a collecting hopper in the rear chamber of the boiler setting from which it is removed in like



CARRIGAN Hand Stoker saves 10 to 25% of your fuel

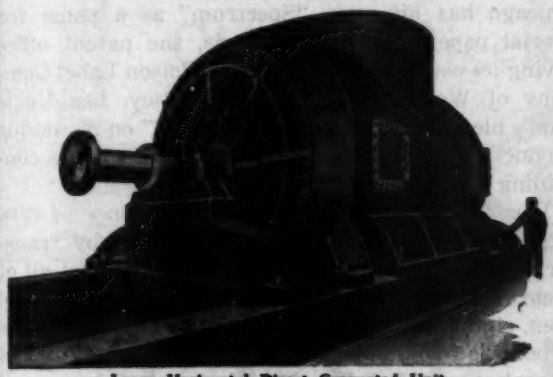
Can be installed in any boiler setting without changing the brick work. Is practically smokeless and disposes of the ash and clinker mechanically. Does the work of the rake, poker and slicebar mechanically. Burns any grade of coal. Costs one-third to one-sixth of automatic stoker.

CARRIGAN ENGINEERING
CONSULTING AND SALES ENGINEERING
CUNARD BUILDING, CHICAGO, ILLINOIS

Leffel Turbine Water Wheels

High Speed — High Horsepower — High Efficiency

Vertical and Horizontal Designs



Large Horizontal Direct Connected Unit

Write for Bulletin 54

The JAMES LEFFEL & CO.
SPRINGFIELD, OHIO

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B. F. Groff, 328 Woolworth Bldg., Lancaster, Pa.
L. B. Dow, Inc., 79 Milk Street, Boston, Mass.
H. H. White, 1303 Fourth Nat'l Bank Bldg., Atlanta, Ga.
William Hamilton Co., Ltd., Peterboro, Ont., Canada.

The Stickle Automatic Steam Control for Paper Machines

WE wish to emphasize the word "automatic." This with us means that the steam follows changes that come to the sheet from free to hard drying stock or any ordinary changes in weights. A control that does not do this in itself is not automatic. This makes a better sheet of paper. We guarantee to hold the moisture at any point you wish with ½ of 1% change. Furnished on 60 days' approval.

OPEN COIL
HEATER & PURIFIER CO.
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WE-FU-GO AND SCAIFE WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

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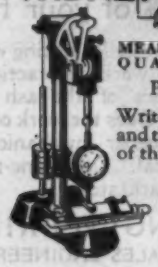
WIDNEY MODULIMETER
A TEST
PATENTS PENDING

MEASURES EVERY PHYSICAL QUALITY IN MATERIAL
Paper, Felt, Rubber, Etc.
Write for our booklet—just out—and the story of the development of this universal testing device.
WIDNEY
TEST LABORATORIES
Physical Tests and Research
352 S. Jefferson St. Chicago

manner to the ash in the furnace. The method of discharging the ash from the furnace is suggestive of many possibilities.

The furnace design herein presented, though possessing good features, is not necessarily typical. In an actual case, the conditions of the service would influence largely the most suitable arrangement.

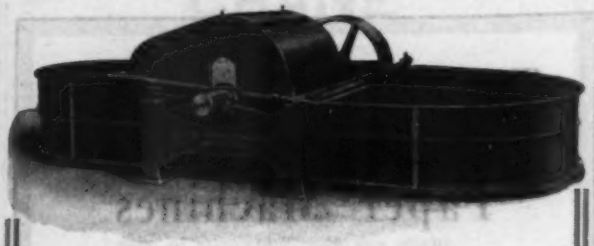
Furnaces for burning powdered fuel demand careful consideration, not so much on account of the novelty of the fuel, but because like other fuels, it possesses its peculiarities, which do not obey a general rule, and must be carefully considered to secure the maximum of usefulness for each kind and size of service.

Developments in Trade-Marking

(*Continued from page 988*)

of the strong man, which Minnesota Wax Paper Company had accepted not long ago as an identification tag for mailing envelopes. Walter B. Templeton of Chicago has hit upon "Spectrum" as a name for special papers for office records, the patent office giving its consent, and the Safety Poison Label Company of West New York, New Jersey, has Uncle Sam's blessing in the use of "Protectal" on its unique product; viz., labels to be applied to receptacles containing poison.

Paper tradesmen have frequent evidence of how large a part in the industry is displayed by transferred patents, licensed processes, etc., but not all of them realize perhaps that there are, every now and then, significant shifts of trade-mark rights. A case in point is found in the assignment by James Miln of Toronto to A. M. Collins Manufacturing Company of Philadelphia of his "M. B." trade-mark covering etchable coated paper and coated relief overlay paper. A side-light supplied by the multiple trade-mark registrations of the past year on the part of various firms seems to reveal leading concerns in the trade as converts to the idea of placing two different trade-marks (as is permissible) on a given product. Thus a brand name may be supported by the firm's general trade-mark covering its entire line.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CORDUROY CLOTH

for SAVEALLS
GROUND WOOD WET MACHINES
WATER FILTERS
SULPHITE WET MACHINES

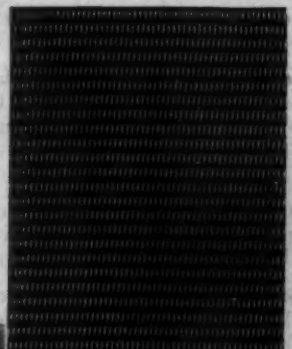
Tyler Corduroy Cloth, for use in the paper making industry, has four distinct advantages over other types of screen, namely:

1—It eliminates the necessity of using backing wires.
2—It gives much longer life than fine face wire.
3—There is no chance for stock to collect between the two covers which occurs where a fine wire and a backing wire are used.
4—Eliminating the backing wire, saves considerable time in applying the cloth to the machine.

Tyler Corduroy Cloth is made from phosphor bronze, monel, or nickel wire, and is carried in stock in all widths up to and including 150 inches.

Samples will be sent upon request.

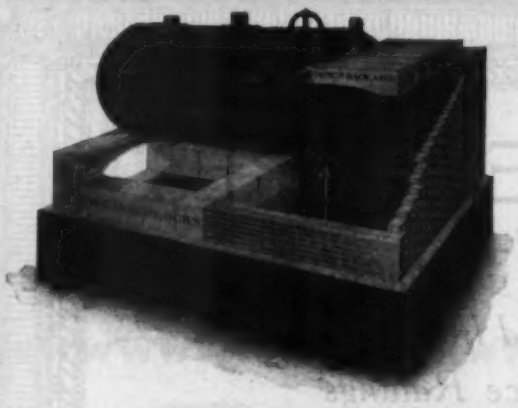
Also Manufacture Fourdrinier Wires, Cylinder Faces, Washer Wires, Backing Wires



The "Tyler" Corduroy Cloth

THE W. S. TYLER COMPANY

CLEVELAND, OHIO



How More Than 8000 Firms Are Saving Fuel

The amount of fuel consumed depends largely upon the condition of the Boiler Settings. Faulty Settings mean inefficient and wasteful combustion.

"STEEL MIXTURE"

BOILER SETTINGS

are not only saving fuel for these 8000 plants, but are also saving the trouble and expense of frequent renewal of settings.

"Steel Mixture" is made in various shapes and sizes for:

Boiler Door Arches—made of these solid blocks withstand the heat of fire and the wear of fire tools long after fire-brick has crumbled away; last 2 to 10 years.

Fire Box Blocks reduce by ⅔ the number of joints where trouble starts so frequently in ordinary brick-work. In many sizes for fire box linings in any type of boiler.

Back Arches—made of specially designed blocks. These arches are gas-tight and will last as long as the boiler.

Furnace Roof Arches are made to fit any arch with a radius of 2 to 10 or more feet. Durable, close-fitting and fire-resisting, these arches outlast arches made of any other material.

Blow-off Pipe Protectors easily installed by any employe; give permanent protection; can readily be removed and replaced.

Write for our "No. 12 Book of measurements," giving detailed information

McLEOD & HENRY CO.
Troy, N. Y.

New York Office: 1400 Broadway
Boston Office: 141 Milk St.

Do You Read the Advertisements?

(*Continued from page* 1016)

of them talk to you about paper stocks of all kinds; others about Hoisting, Conveying and every conceivable thing that you can think of; also Filtering Systems, Alum, Casein, etc. The Sims Company talks about Feed Water Heaters, and another about their machinery for wrapping roll paper. Voorhees Rubber Company tells you about their Rub-Steel Valves. Thomas H. Savery talks about Dryer Exhaust Unit, while the Sandy Hill Iron & Brass Works, Beloit Iron Works, the Valley Iron Works and the Holyoke Machine Company tell you about their big line of paper mill machinery.

The front page shows an announcement of another new firm telling you the story that they can sell you anything in the line of piping equipment, or can install the whole system for you. In another place you will find the story of chain drives; still another one, baling presses, all kinds of acids, chemicals and colors. Another page tells you the story of water softening, which is going to become more interesting to all manufacturers all the time. Still another tells you how to keep your boilers clean from soot and save on the coal bill. And again how to get rid of the vapor in your paper machines, and a thousand and one other things in which every paper manufacturer is interested.

Surely, there are many other things of interest in these pages that are not seen in the regular reading pages, and we are sure that it would be a profitable habit to get into to go over these announcements every issue.

Prevention of Decay in Paper Mill Roofs

(*Continued from page* 1006)

contains 0.116 grains of water per cubic foot (see tables); suppose this air leaves the mill at a relative humidity of 95% when heated to 110°. It is then carrying 24.806 grains of water per cubic foot. In passing through the mill it has taken up 24.806 — 0.116 = 24.690 grains of moisture per cubic foot.

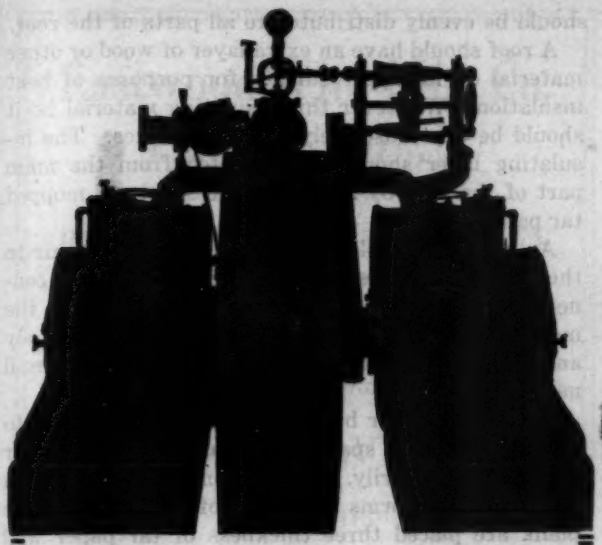
Then it will require $\frac{700{,}000}{24.69}$ = 28,351 cubic feet of air per minute to ventilate this machine room.

Summary of Points for Consideration in Paper Mill Roofs

The problems of moisture condensation and decay of timber must be kept constantly in mind when designing the roof of a pulp or paper mill. These two conditions have the same cause, but both may be avoided by building the roof in a special way if efficient heating and ventilating systems are installed.

The roof should be built of cedar, redwood, cypress or high grade southern pine, all of which are woods naturally resisting attack by decay.

Air systems of heating are preferable to those with steam coils. Whatever the system, all heat



THE BALL VARIABLE SPEED ENGINE

solves the problem of your variable speed drive. Its reliability results in maximum production. That's why *one in every three of these engines is a repeat order.*

Ball Engine Co., Erie, Pa.

Variable Speed Engine

The engine illustrated above is especially designed to drive paper machines, giving continuous and reliable service. A patented safety device protects your employees and plant.

THE BROWNELL CO., Dayton, Ohio

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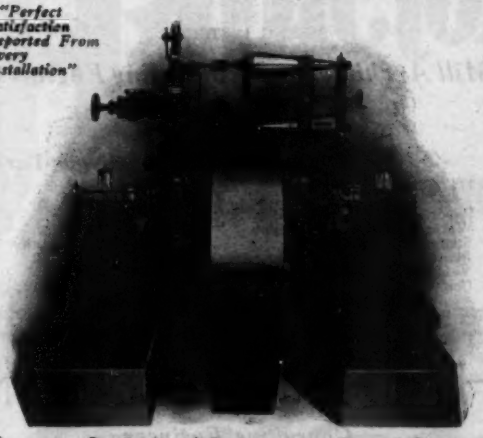
Large, Modern Designed # ENGINES

"Perfect Satisfaction Reported From Every Installation"



Economy—Continuity of Performance—Ease of Care and Adjustment—Infrequency of Repairs

These, the important requirements of an engine, are met by "ERIE" double variable speed engines.

To the Paper Mill Trade

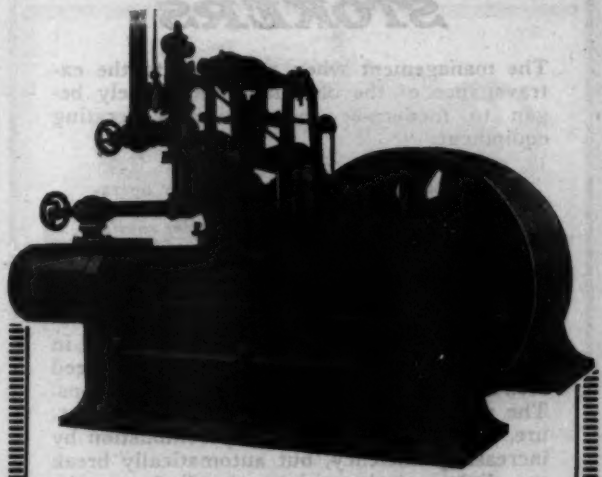
We will be glad to furnish full information as to price, delivery and equipment to meet your requirements, and will appreciate an opportunity to furnish these details by mail and the privilege of personal interviews being arranged.

MANUFACTURED BY

ERIE ENGINE WORKS *Established 40 Years* **Erie, Pa.**

Special Sales Representatives

New York—W. B. Connor, Inc., 90 West Street.
Boston—Schumacher-Santry Co., 141 Milk Street.
Chicago—E. E. Maher, 818-819 Michigan Boulevard Building.



Variable and Constant SPEED ENGINES

Paper Mill Economy is assisted very materially by the installation of High Grade Variable Speed and Constant Speed Engines.

Send for List of Installations and Catalog

CHANDLER & TAYLOR COMPANY
Indianapolis, Indiana.

Saved 10 Tons of Coal per Day

Installation of Six-Retort Riley Stokers Under 500 H. P. Boilers.

A Paper Mill power plant reports that it has saved 36 men and 10 tons of coal per day since the installation of

RILEY UNDERFEED STOKERS

The management when awakened to the extravagance of the old plant immediately began to modernize their power generating equipment.

Since putting the new station into operation the Haverhill Boxboard Company of Haverhill, Mass., reports *"everything running in first-class manner, better than we could even hope; have effected $52,000 saving the first year —expect to exceed this figure next year.*

The Riley Stoker effects maximum saving in fuel and labor because it is the only Underfeed stoker that is automatic in all its functions. The reciprocating grates, the distinctive feature, not only greatly intensify combustion by increasing efficiency, but automatically break up clinkers and continuously discharge the refuse.

Send for the Riley Stoker catalog D-1. It will show you how to save fuel and labor, two of the most vital features in the operation of your plant.

Sanford Riley Stoker Co.

WORCESTER, MASS.

British Licensees: Erith's Engineering Co., Ltd., London. French Licensees: Erith, Leroy & Cie., Paris, France.

should be evenly distributed to all parts of the roof.

A roof should have an extra layer of wood or other material on its upper surface for purposes of heat insulation. Whatever this insulating material is, it should be kept absolutely dry at all times. The insulating layer should be separated from the main part of the roof by at least three sheets of mopped tar paper.

An efficient ventilating system supplies dry air to the mill and carries all moisture away. Fans connected with hoods over paper machines collect the moisture and carry it off, while other fans supply an equal amount of dry air which enters the mill near the roof.

A suggestion for building a mill roof would be to start with such a span as will carry two-inch cedar planks satisfactorily. These planks are dressed on one side which forms the ceiling of the mill. On this plank are placed three thickness of tar paper well mopped together with pitch, then there are laid two or more inches of cedar and finally the roof is finished with a built-up roof covering.

James L. Carey

Paper Mill Architect and Engineer

208 N. Laramie Ave., Chicago, Ill.

GEORGE F. HARDY

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PAPER, PULP AND FIBRE MILLS INCLUDING BUILDINGS AND COMPLETE MECHANICAL EQUIPMENT
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Eastwood Wire Mfg. Co.

Fourdrinier Wires

BELLEVILLE, NEW JERSEY
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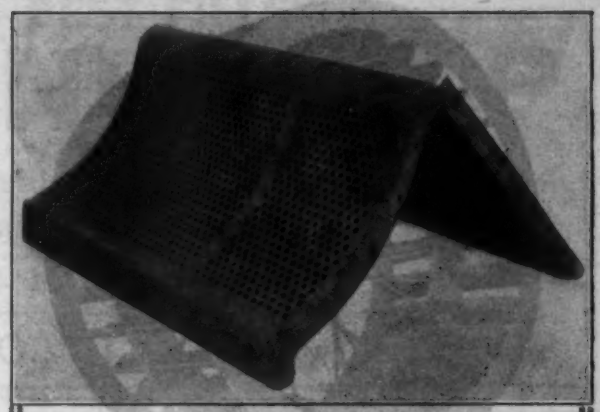
We also manufacture

Cylinder Wires
Valves Unions Cocks
Fittings
Castings, etc.
FROM OUR
PERFECTION BRONZE



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

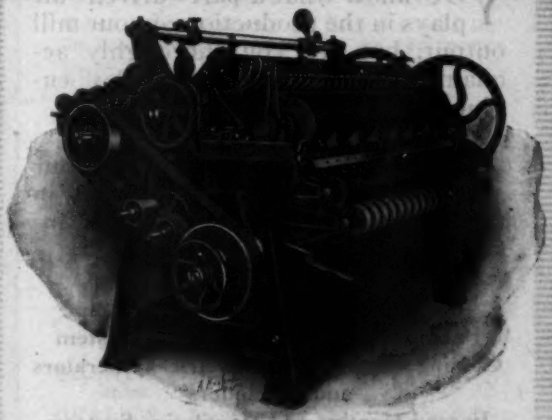
The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

Appleton

Felts and Jackets

Manufactured By

APPLETON WOOLEN MILLS
APPLETON, WIS.

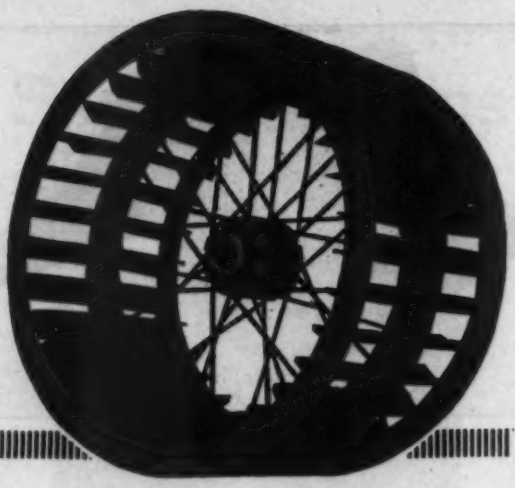


PAPER CUTTERS

Single, Duplex, and Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

Hamblet Machine Co.
LAWRENCE, MASS.



Bayley

AIR ENGINEERING
in the
PAPER INDUSTRY

YOU know what a part "driven" air plays in the production of your mill output, but are you thoroughly acquainted with what the Bayley engineers are doing for paper mills?

If you are not, write us at once—our specialized ability is at your service in the designing, construction and installation of

Forced and Induced Draft System
Pneumatic Chip Ash Handling System
Cooling Systems for Electric Generators and Calenders
Forced Heating and Ventilating Systems
Absorption Systems
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Practical advice, including plans and estimates, will be furnished on request.

Bayley Manufacturing Co.
732 Greenbush Street,
Milwaukee, Wis.

Proceedings of Superintendents' Meeting

(*Continued from page* 1022)

Now, another question Doctor, do the fibers of paper ever become passive to ordinary changes in relative humidity so that they do not stretch as much as they originally did? In other words, does that function decrease with age?

Dr. Kress: I could not say. In that connection, though, there might be one thing that is interesting. You take a piece of paper, take enough to cut it into the number of strips that you want, and you can raise that up or down, and keep on raising it back and forth, and it won't affect the stretch of your paper. In other words, we have taken papers and swung them through from 40 per cent humidity to 90, which is about as high as we can get without rusting your instruments. When you get to 94 you are to the dew point, and you rust your instruments very quickly. But you can take those papers and drop them down again and raise them, and within the experimental margin of error, the stretch will be the same. In other words, raising the relative humidity up and down through these changes has apparently no effect on the stretch of the paper.

The Secretary: Well, would it be possible to make the same samples, available that you used several months ago, in making your tests and see if they have not deteriorated in respect to stretch? About 2 years ago you made an extensive set of experiments on the effect of humidity on paper. If these papers were still available, would they be less susceptible to humidity than they were when those previous tests were made? The printer does believe, and I believe it myself, that the aging of paper, what we call seasoning in the pressroom does not only consist in the absorption by the paper of the moisture content that exists in the pressroom and in the store room, but that it also makes the paper less susceptible to moisture than a paper that has not been so treated.

Dr. Kress: The ordinary seasoning that I understand the retail paper manufacturer gives is seasoning of about a month's time. Now, I would imagine that a piece of paper taken right off of the machine under the stress and strain it has undergone in going over that machine, the contraction as it went over the dryers and the tension as it went over the calenders, would give more trouble in respect to shrink and stretch than if the paper were allowed to season for a period of time. I know it works that way in steel and I should imagine it worked that way on paper. Just on that account we always wait at least 24 hours before we test any paper off our machine.

The Secretary: Haven't some of you printers or paper makers some questions on this subject?

Mr. Dailey: Mr. Chairman, I would like to ask Dr. Kress why there is so much difference between the paper tests on the width and on the length of the machine?

Dr. Kress: I think the answer for that is this: If you could get an even distribution of your fibers as they went onto the wire, that is, if you get as many running lengthwise, as you did cross-wise, and at all angles, you would have a paper of uniform strength. If you could distribute your fiber uniformly in the sheet, instead of having a majority running the length of the machine, you would have a paper running very uniform. You will always find that the majority of the fibers go headways down onto the wire. Of course, you try to get away from that with your shake, but you don't succeed. Occasionally you will find a piece of paper that is stronger across the machine, but that is the abnormal paper. As a rule, the length of the fiber is parallel with your machine and that means you have less fibrous crossings this way. You have the width of your fiber where the expansion takes place, and your fiber expands more through the width than it does through the length.

You see, the most desirable thing is to get your fibers evenly distributed and then you will have uniform strength.

Mr. Dailey: Mr. Chairman, I am not quite satisfied with that answer. I think Dr. Kress ought to tell us how we are going to overcome it. (Laughter.)

Dr. Kress: Now, I will talk to the printers first. You printers have got lots of trouble. You ought to see the letters we get. We get about 20 or 30 letters a day, not from the printers alone, but all sources. First of all they simply tell us that such and such is the matter, and ask us, "Will you kindly tell us what to do," as though we knew anything about it to start with.

What the printers ought to do, they ought to get busy and spend some money. We will be glad to let them use our equipment and our laboratory. To attempt to replace our equipment today, couldn't be done under probably $75,000. You can use our equipment, but send a man there to do these things. What we have carried on as illustrated here is only the beginning. What we have to find out before we do any-

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thing is some of the fundamental conditions causing these things, and then we may have a remedy. Now, you are never going to get away from the stretch of paper; you are always dealing with the hygroscopic theory. But there is a certain condition that you want to work out and that is what you have got to work on.

Now, we only have a very limited staff and a large number of problems. One thing I would like to see is for you printers to spend a little money and send a man to us. You can't do that experimenting yourselves as cheap as we can do it for you. All it will cost is the salary of the man you send us and the cost of the material while you are keeping him there. You all, more or less, suffer from the same troubles, if the letters that I receive from the printers are any criterion, the troubles are mostly moisture, and static electricity which are your bugbears.

And then, there is one other thing and that is they ought to study the relation of glare to eyesight. It is extremely important. There is no excuse for running some of the books that are being published today, deliberately trying to ruin a man's eyes after they sell him the book.

Some of those things ought to be worked out. We started it and had to give it up on account of lack of funds. What I have indicated here is just skirting the outside edge. The fundamental knowledge that goes with this requires a great deal of work, and if we could only get somebody to do that work, it would be fine, because we haven't got the men to do it; we are tied down by Washington to certain definite problems that we have got to work on, and this other work is simply sort of sandwiched in on our time and if you would be willing to send a man there and pay his expenses our equipment would be available and we would arrange so as to give him considerable assistance.

Mr. Dailey: Mr. Chairman, I would like to ask a question in regard to the relationship between static electricity and moisture. Where do we stand as to the necessary dryness in relation to what we call atmospheric dryness, or over drying, 100 per cent? Or why does the paper contain electricity when it is running from our rolls on the printing press? Perhaps the secretary could give us some light on that.

The Secretary: I will try to answer Mr. Dailey's question. Static electricity is sometimes called frictional electricity. The usual source, as in the case of a pressroom, is friction. It is called static, because it is retained for a time on an excited or charged body, such as paper. The conditions most favorable for the generation of a static current are low temperatures and low relative humidity. In a cool dry atmosphere, the slightest friction of substances having a low moisture content will generate a strong static charge, while in a room heated to 80° F. and with a relative humidity of 72%, it will be very difficult to generate any charge. The moisture in the atmosphere acts as a conductor and permits the free discharge of the static charge, and thereby prevents the accumulation of electricity in the paper. The colder the room, and the dryer the atmosphere, the more trouble they have with electricity, and the nearer to bone dry the paper is, the more trouble they have with electricity.

Before the advent of neutralizers of the Chapman type and the various Gas bars that are now in use, it was the universal custom in all pressrooms to dampen the paper before it went to press. When I first started to work in a printing pressroom, we had no neutralizer system of any description to kill the static charge, but we dampened all the paper that went to press. In the case of coated and other papers that did not permit wetting down, we used glycerine mixture which we rubbed on all parts of the press with which the sheet of paper would come in contact.

The President: They have all been talking about this moisture proposition, but there has been no one to tell us how much moisture we ought to have in our paper.

The Secretary: That is what I have been trying to figure out. I believe that under the ideal conditions of 80° F. and 72% relative humidity, the paper would contain about 7% or 8% moisture.

The President: Well, the paper maker figures that he ought to carry about 6%. The moisture may vary from 5% to 8%, and it will average about 6% all around, but I have not heard any of you tell us how much we ought to have.

Dr. Kress: Mr. Boyce, the paper makers ought to sell their paper with the maximum amount of moisture in it that will permit the paper to maintain the required strength.

The Secretary: The paper maker ought to sell more water.

Dr. Kress: That is right, he ought to sell more water. Sometimes they do sell too much, but in almost all cases, they do not sell enough.

The Secretary: If the printer installed constant temperature, and humidity apparatus in his pressrooms he would demand that the paper maker deliver all his paper bone dry,

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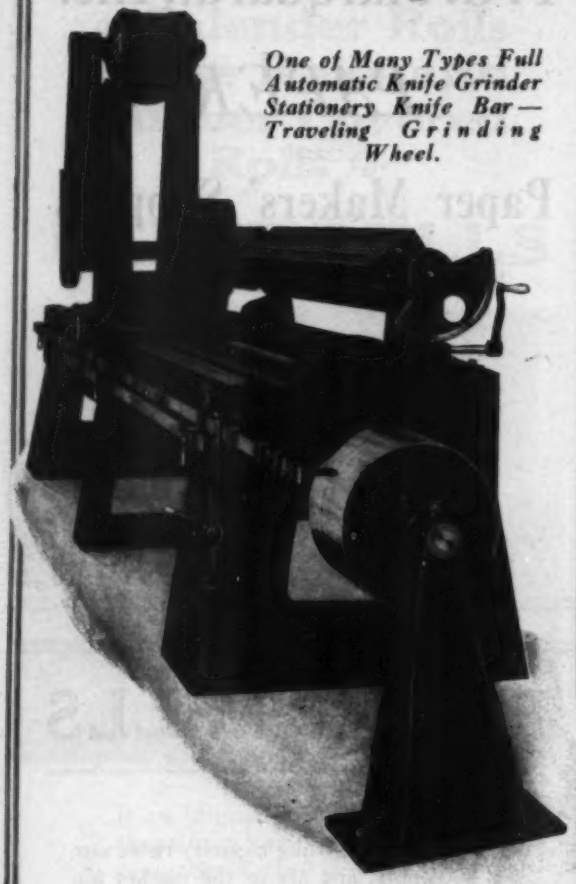

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because he could then put the water in himself. (Laughter.)

The President: Of course there are a number of things that enter into the drying of paper. Mr. Massey, here, and Dr. Kress don't understand all that part of it. Your sheet may have lots of moisture in one place and not so much in another place, but they couldn't tell you how that got in there, but our superintendents know all right.

The Secretary: Go ahead, Mr. Boyce, and tell us all about it.

The President: One of the principal factors in getting a good, evenly dried sheet is to keep your sheet as near a uniform thickness as you can all the way across and then keep your press rolls in proper shape so it presses evenly all the way across. If you have good, even press rolls, you may have the same amount of moisture all the way across. That is one of the principal factors.

Mr. Milon: How is it that the sheet, hanging over the back side of the machine always has more moisture than the front?

The President: You can overcome that. I have my eye on a superintendent here who has had some experience with that. He had a new machine and he had trouble with it. Would you just as soon tell them, Paul? Mr. Smith had a machine put in a couple of years ago, and he had a regular pipe to blow the steam in, and as he makes light weight catalogue paper, he could not do anything with it at all. He finally had to run a pipe in there, and have a line and distribute the steam equally to the dryer. You can do that also. I don't think it will give you any particular trouble. The only reason that your front side and back side differ is that you do not distribute the steam equally inside of the dryer.

Mr. Milon: I experimented with that by running the steam in and having a larger pipe in the center with holes bored in it, and still it did not make any difference.

The President: I think if you will talk to Mr. Smith and give him all the details that he will straighten you out all right. I believe that it is principally on wide machines that you get so much variation.

We have one other speaker on the program this afternoon and that is the Secretary of the Superintendents' Association who has taken his coat off and worked and believe me he has had to work. The success of this meeting of our organization, and all the meetings we have had before, about 99 per cent of the credit for the success we have had is due to the secretary and not to our president, as a lot of you fellows here tried to make me believe last night. The credit is all, or 99 per cent due to the efforts of Mr. Massey. (Applause.)

Now Mr. Massey can talk on anything, but he is down on the program to speak to you on the subject of "Difficulties Encountered in Printing Papers," a subject in which you are all interested, and which I am sure Pete knows something about, as he has been in a printing pressroom for 20 years, and has given this subject considerable study. I don't know if you are all acquainted with the fact that his name is Peter, but I have gotten so that I call him Pete now. I have known him for the last 9 months and there are many of you here who have known him much longer than that, and I am sure that you will all agree with me that you have found him always a mighty fine fellow and strictly on the square. Mr. Massey, Gentlemen. (Applause.)

The Secretary: Mr. President and Gentlemen, I suppose that you have all noticed that the introductions of our worthy president are getting more lengthy and flowery as he goes along. I am sure that Mr. Grau, our first speaker yesterday morning could find no criticism on the brevity of this last introduction. In regard to his attributing to me all the virtues of a paragon and all the credit for the success of this organization, I wish to say that it proves conclusively that when you elected Mr. Boyce president of this organization, you exercised some very good judgment, and that your confidence was well placed. You all know, and I am sure that I know, because I am in a position to know, that all this 99% stuff that he has been giving you is not even 50-50 and if any credit is to be handed out, its Fred. C. Boyce of Wausau, who deserves it. Now, gentlemen, I have no prepared paper for you nor any prepared speech, I am just going to talk to you about the pressroom troubles and make an attempt to place them before you in such a manner that you will be able to realize how important some of the small trivial deficiencies in your paper are, when they reach the printing pressroom, for after all is said and done, they are almost exclusively trivial matters as far as the paper manufacturer is concerned.

I have spent twenty years in pressrooms, doing various classes of work, and have tried to apply the little chemistry and physics that I have to some of these problems with more or less success, principally less. Some of you superintendents know me from coming around the mills with complaints about your product, and a lot of darn fool questions, and then telling you what I thought was the matter with your product. I

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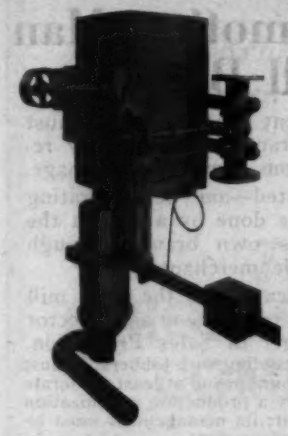

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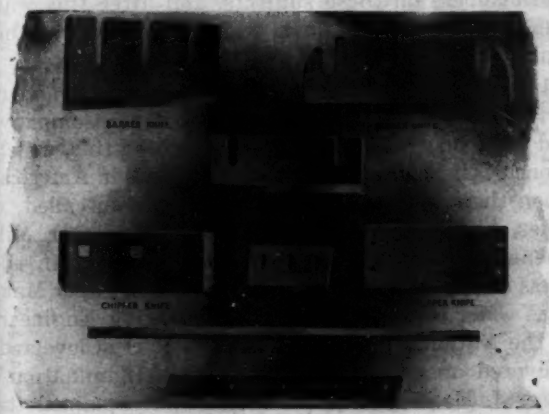

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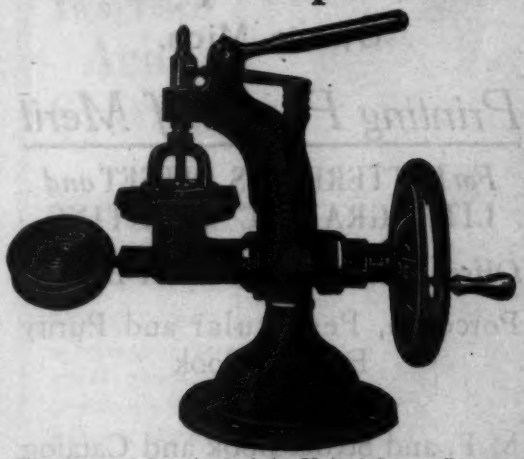

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never told you how to fix it, but I did tell you what I thought was the matter with it, and the troubles we were experiencing in the pressroom. So, in my talk today, do not expect me to tell you how to make paper, but rather how not to make it in order to overcome some of the pressroom troubles, and assist in the production of a better printed sheet. The manufacturer of printing papers wants to make paper that will suit the printer; that is why he is in business and the paper maker who comes closest to suiting the printer will be the most successful, and place his product in that enviable position where it will be its own salesman.

Now, I am not going to go over the same ground that was covered by Dr. Kress nor am I going to tell you that these are all the troubles the printer has; there are lots of others, some of them perhaps I have never even heard of. As I said before, my experience in the printing game is only twenty years, so you could not expect me to know very much about it. The only man that I have ever met, who knew all about the printing business was in the game six months. (Laughter.) After a man has had a year's experience in the printing business, he realizes that he does not know all about it, and the more experience he acquires, the more positive he is that he doesn't know very much about it until finally he is absolutely sure that he doesn't know anything about it. (Laughter.)

(Mr. Massey then gave his address, which appears in this number.)

Miami Valley Division Meeting

The second meeting of the Miami Valley Division of the American Pulp & Paper Mill Superintendents' Association was held at the Hamilton Club, Hamilton, Ohio, January 17th. This was to a degree a combined meeting with the Cost Association of that territory.

The morning session was taken up with addresses by Mr. G. J. Willman, of the Richardson Paper Company of Lockland, Ohio, on "The Why of a Paper Mill Cost System," and W. T. Schmitt, of the American Writing Paper Company, at De Pere, Wis., on Cost Finding. There was considerable discussion between the members on these subjects, and after this was over, it was time for lunch, which was served at the Club.

In the afternoon, most of the members made a visit to the plant of the Champion Coated Paper Company, and were very much interested in visiting this, which is one of the largest paper making plants in America. Upon their return, the meeting was again called to order, and Mr. Alexander W. MacVie, Paper Mill Chemical Engineer of Kalamazoo, delivered an address on "Clays and Other Fillers Used in Paper Making." Mr. H. W. Spaulding, Illuminating Engineer, of the National Lamp Works, Nela Park, Cleveland, delivered an address on "Paper Mill Illumination." Peter J. Massey exhibited forms and explained the intricasies of the make ready on the fast running printing presses of today. All of these talks, particularly that of Mr. MacVie, brought out considerable discussion, part of which is printed with Mr. MacVie's address on another page, and we are sure was of considerable value to the Paper Mill Superintendents present. There were many other discussions started, all of which were helpful in bringing out things that were on the minds of the superintendents. Dinner was served at 6:00 o'clock, after which everyone around the board was asked to say something, which

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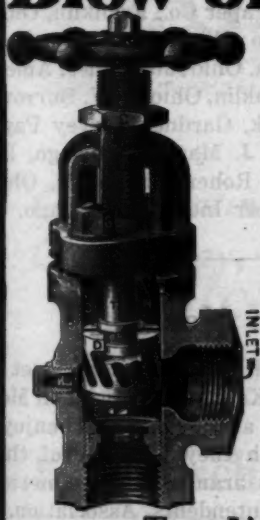

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kept the interest up until 9:00 o'clock at night, when the meeting was disbursed.

The next meeting of this branch of the Superintendents' Association will be held on the last Saturday in February, presumably at the same place, though this is to be decided upon later.

The officers elected by this association are as follows: President, A. O. Rolfe; vice president, H. W. Server; secretary-treasurer, H. W. Latimer.

Those attending the meeting were as follows: Geo. Wilcox, Chicago, Ill.; H. W. Server, Miami Paper Co., West Carrollton, Ohio; C. C. Ulrich, Franklin Paper Co., Franklin, Ohio; C. F. Goodenough, Atena Paper Co., Dayton, Ohio; R. Clayton, Alton Box Board & Paper Co., Alton, Ill.; John Jack, Philip Carey Mfg. Co., Lockland, Ohio; Ray Gleason, Franklin Board & Paper Co., Franklin, Ohio; Chas. E. Raney, Middle West Box Co., Kokomo, Ind.; Max Zimmerman, Bolt Paper Co., Cincinnati, Ohio; Tom Harvey, Gardner-Harvey Paper Co., Middletown, Ohio; Wm. Schenck, Champion Coated Paper Co., Hamilton, Ohio; A. O. Rolfe, Champion Coated Paper Co., Hamilton, Ohio; Joe Reed, Champion Coated Paper Co., Hamilton, Ohio; Herbert Sutor, Champion Coated Paper Co., Hamilton, Ohio; Wm. Benzing, Champion Coated Paper Co., Hamilton, Ohio; Louis J. Meunier, Monroe, Mich.; H. W. Latimer, Beckett Paper Co., Hamilton, Ohio; A. E. Jones, American Writing Paper Co., Franklin, Ohio; M. Ludwig, Mead Paper Co., Chillicothe, Ohio; M. Ludwig Jr., Mead Paper Co., Chillicothe, Ohio; L. T. Murphy, Auglaize Box Co., St. Marys, Ohio; B. Benson, Kalamazoo, Mich.; Frank Boggs, Hamilton, Ohio; H. Kutter, Hamilton, Ohio; C. E. Willman, The Richardson Company, Lockland, Ohio; W. T. Schmidt, American Writing Paper Co., De Pere, Wis.; A. MacVie, Kalamazoo, Mich.; J. C. Spaulding; Jas. Coleman, Seattle, Wash.; John Maloney, Franklin Coated Paper Co., Franklin, Ohio; J. C. Death, Franklin, Ohio; W. Patchell, American Writing Paper Co., Franklin, Ohio; Joe Puller, American Writing Paper Co., Franklin, Ohio; S. V. Burrows, Dayton, Ohio; B. Van Kirk, Gardner-Harvey Paper Co., Middletown, Ohio; P. J. Massey, Chicago, Ill.; Michael Roher, Doiman & Roher, Cincinnati, Ohio; E. B. Fritz, Publisher, Paper Industry, Chicago, Ill.

Kalamazoo Meeting

Some twenty paper mill superintendents met at the Park-American Hotel, Kalamazoo, Mich., on Monday evening, January 19th, at 6:30 p. m., and enjoyed a good dinner, after which they held one of their monthly meetings for this branch of the American Paper and Pulp Mill Superintendents' Association.

The principal address was delivered by W. A. Darrah, on "Colloidal Chemistry as applied to the Paper Industry," which occupied considerable time

The Meaning of Service

THE word service is from the Latin word Servitium, meaning—"Labor or effort for the benefit of another or at another's command." It is interesting to observe that the meaning is the same today as in ancient Latin days and that undoubtedly service will be service until the end of time.

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and which brought out considerable discussion on this subject.

Mr. Darrah's address will be published in the March issue of The Paper Industry. Peter J. Massey then repeated the address given at the meeting at Hamilton several days before on "Make Ready." Later a general discussion was started that lasted until a late hour.

Connecticut Valley Meeting

The regular January meeting of the Connecticut Valley Branch of the Cost Association was held in Holyoke on Monday, the 19th. The members of the Cost Association assembled at the Hotel Nonotuck for dinner and for their business meeting, after which they adjourned to the Hotel Hamilton for a joint meeting of the Cost Association and the local Technical Association. A large number of representative men from both associations were present, and a most enjoyable and profitable evening was spent together.

Mr. B. E. Hutchinson, treasurer of the American Writing Paper Co., acted as chairman of the meeting, and his witty remarks and many timely pleasantries added very much to the meeting.

The subject in discussion was "The Handling and Costing of Materials used in the Manufacture of Paper." Mr. Clark of the American Writing Paper Co., with the aid of a chart which he had previously made, gave a splendid exposition of the "Best Way to Handle Rags in Preparing the same for the Beater Side." His talk was very explicit and showed that he had put much time in to the preparation of his subject.

Following Mr. Clark's talk, the subject was opened for general discussion and was participated in by many of the members present. Questions were asked and suggestions were made which helped in bringing out more clearly the particular points of the talk.

Following Mr. Clark, Mr. Kiley gave a very interesting description of "The Best Way to Determine the Net Retained Fibre in Old Papers which are Prepared Through the Cooking and Washing Process." Mr. Kiley brought forward many novel ideas, particularly in checking and measuring stock. His suggestions showed very close application on the subject, and much study on his part, in an endeavor to give a practical and thoroughly efficient way of handling this kind of stock in the slush form.

After Mr. Kiley had finished talking, there were many interesting questions and suggestions from the floor. The third and last speaker was Mr. Harrigan, of the American Writing Paper Co., and his subject was "The Best Method of Handling Pulps." Mr. Harrigan reviewed the various methods in common use in paper mills today, and then gave a very clear descrip-

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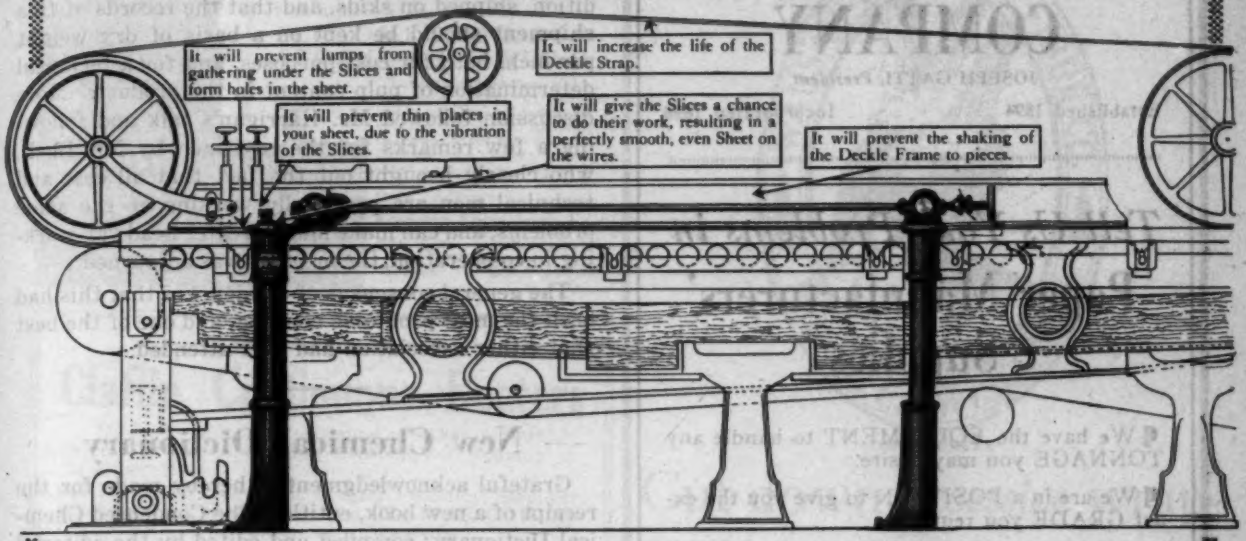
It will prevent lumps from gathering under the Slices and form holes in the sheet.
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tion of the way in which he felt pulps should be handled to the best advantage. He consistently stressed the point that the pulp mills should be urged to ship hydraulically pressed pulps in the wet condition, shipped on skids, and that the records of this shipment should be kept on a basis of dry weight per inch, both for cost purposes, and for a technical determination of pulp content in the product. More discussion followed Mr. Harrigan's talk and following a few remarks for the cost men by Mr. Bush, who clearly brought out the fact that all cost and technical men are practically working on the same problems, and can make much greater headway working in co-operation, the meeting was adjourned.

The general consensus of opinion was that this had been the most profitable meeting, and one of the best that either association had ever attended.

New Chemical Dictionary

Grateful acknowledgment is hereby made for the receipt of a new book, entitled, The Condensed Chemical Dictionary; compiled and edited by the editorial staff of the Chemical Catalogue Company, Inc., of New York City, and which is now being published by that firm.

It is a complete reference volume for all requiring quick access to a large amount of essential data regarding chemicals, and other substances used in manufacturing and laboratory work.

Individuals, and firms, less familiar with technical knowledge of chemical detail, will find this book to be a valuable asset; as will also, the professional chemist, to whom such a handy reference will prove a great time saver.

It is well printed on a sufficiently large page to provide marginal space on which extended notes can be made, and is bound securely in library buckram, making in all a handsome and attractive volume.

Packing Express Shipments

New rules in regard to packing express shipments have been recently promulgated by the United States Railway Administration. These rules will not permit the use of paper wrapping for packages over 25 pounds, nor of ordinary paper boxes, wrapped or unwrapped, when the weight of the package is over that limit. For shipments over 25 pounds, wooden containers, or containers of fibreboard, pulpboard, or corrugated strawboard material are required. The cartons must be made of materials of specified "test strengths," similar to those required for the freight service, and the containers must bear the stamp of the manufacturers, certifying that the material used is of strength required for the weight of the shipment carried in it, as called for in the rules.

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There seems to be no let up in the demand for paper. In more normal times, concerted advances in prices on any commodity act as a signal for consumers to retrench in their buying, in at least a measure, but there are no visible signs that users of paper of any kind are pursuing this course at present. Further advancement in prices evidently serves as a stimulant to demand, and buyers are operating on fully as broad a scale as at any time during the period of brisk business in recent months.

The market for paper as it shapes up at the moment presents a very healthy aspect. Naturally consumers are not purchasing recklessly with costs at prevailing heights, but the truth of the matter is that the average user of paper has need for such large quantities and is experiencing so much difficulty in obtaining the supplies desired that demand of exceeding keenness and heavy volume is the result. To say that manufacturers have their hands full in complying with the wants of all their customers is putting it mildly. In fact, the majority of papermakers have given up trying to satisfy all those who would buy of them and are doling out their production among regular buyers in such a way as to cover as much ground as possible. With most mills having their output foresold for some months, this is the only procedure for them to follow.

Prices have advanced on nearly every class of paper during the past few weeks, and in this connection a new factor is commencing to play an all-important role. That is, increased cost of production. Many of the eastern paper mills have granted an additional advance in wages to their operatives, while the cost of raw materials of virtually every kind has steadily soared recently. Wood pulp prices are constantly moving upward, rag and waste paper stock are jumping at a record-breaking pace, chemicals are costing more—in short, the paper manufacturer is facing increased costs in turning out his product that compel him to boost his own selling prices.

How much longer existing conditions are to prevail depends entirely on the length of time demand keeps on in its present capacity. Manufacturers of any commodity cannot be expected to satisfy a demand of a hundred and twenty-five per cent volume with an output of a hundred per cent. And that is the true situation in the paper industry today. When buyers retrench in their operations to a point where producers are enabled to cover their wants, then the market will settle down to a more stable basis, but there are no indications that this situation is anywhere near.

The leading producers of fine papers have advanced prices an average of twenty per cent above previously ruling levels, and other manufacturers are following suit. Book papers are in a very strong position and are gradually moving up in value. Tissues and wrappings are quotably higher, as are boards of various description. The news print market is firm with just as much of the demand remaining unfilled as formerly. Strength with a big "S" is the outstanding characteristic of the market in its entirety and gives promise of continuing to be for some time to come.

The experimental paper mill of Arthur D. Little, Inc., Cambridge, Mass., has been busy for some months on demonstrations of the paper making quality of linters and cotton hull fibre, which, during the war, were the chief source of cellulose for the nitrocellulose used in smokeless powder. The mill is now engaged on the commercial production of the acid-washed filter paper for quantitative chemical analysis, formerly imported. Its capacity for this purpose is more than sufficient to meet the entire American demand, and to ensure the highest possible quality of product. The mill is operating on distilled water.

The Experiment Station of the Hawaiian Sugar Planters Association has issued a bulletin (No. 45), published at Honolulu, on "The Paper Making Qualities of Hawaiian Bagasse," by Arthur D. Little, Inc., of Cambridge, Mass. It contains a general survey of the question, a discussion of previous attempts to use bagasse as paper-making material, description of the principal paper making processes, discussion of the technique involved in handling Hawaiian bagasse with reference to the experimental results obtained, the commercial aspect of making paper in Hawaii from bagasse and the class of product which might be made, estimates of production, and costs, and tabulation of experimental data. The report followed the successful design and construction of a mill in Hawaii, now in operation making a soft paper felt from bagasse, which is used as a protection against weeds in the sugar cane fields under the Eckert patents. By this means some 50 to 70 per cent of the labor costs are avoided, and the yield is increased. The sharp, stiff cane sprouts break through the felt while the soft-topped weeds curl up and die.

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ROPE—BAGGING
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ESTABLISHED 1895
Foreign and Domestic
Rags, Bagging, Rope and Waste Paper
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Papermaking Rags

An active demand continues for virtually every grade of papermaking rags, and prices throughout the list show an upward tendency. Consuming mills are placing orders for large amounts and are granting very attractive figures, despite which the market seems bare of sizable accumulations of rags. Packers assert that the heavy snowfall and cold weather in various parts of the country have materially curtailed the collection of rags, and that as a result they are unable to obtain normal supplies regardless of the efforts they exert. Although much of the talk in this connection may be for the purpose of influencing the market, the fact remains that consumers are meeting the prices quoted and are freely absorbing material, thus indicating that they are using large tonnages of rags. New white shirt cuttings are in a booming condition and sales of No. 1 packing have been recorded at 18.50 to 19 cents per pound at shipping points. Old whites also are quotably strong at a basis of around 12 cents for No. 1 packing. Roofing rags are selling freely at 3.50 to 3.75 cents f. o. b. shipping points, and thirds and blues of repacked quality command 5 to 5.25 cents. F. o. b. quotations are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	18.50-19.00
White shirt cuttings, No. 2	12.50-13.00
Fancy shirt cuttings	12.00-12.50
Washables, No. 1	10.00-10.25
Unbleached muslins	14.50-15.00
White lawns	16.00-16.50
Overall cuttings, blue	12.50-13.00
Black Silesias	7.50- 8.00
Old Stock—	
Whites, No. 1 repacked	11.50-12.00
Whites, No. 2 repacked	6.25- 6.75
Whites, house soiled	4.25- 4.50
Whites, street soiled	4.00- 4.25
Thirds and blues, repacked	5.00- 5.25
Thirds and blues, rough	4.50- 4.75
Black stockings	4.25- 4.50
Lace curtains	9.00- 9.25
Cotton canvas, No. 1	5.50- 6.00
White cotton batting	5.50- 5.75
Roofing, No. 1	3.50- 3.75
Roofing, No. 2	3.35- 3.50

Rope and Bagging

Further advances have been scored by prices on old ropes and baggings under a steady demand of broad proportions from paper mills. In company with most other descriptions of raw papermaking material, dealers are repeatedly raising prices, while claiming to be unsuccessful in acquiring fresh supplies of usual size, and consumers' requirements evidently are of sufficient weight to oblige them paying the advances. Old No. 1 Manila rope is selling at 6.75 to 7 cents per pound at shipping points, and mixed strings at 3 cents. No. 1 gunny readily commands 3.75 cents and more, while No. 1 scrap bagging is moving in increasing quantity at a price range of 3.25 to 3.50 cents a pound. Prices follow:

	New York and Chicago
Gunny, No. 1 domestic	3.65-3.85
Gunny, No. 1 foreign	3.65-3.85
Scrap bagging, No. 1	3.25-3.50
Roofing bagging	2.75-3.00
Wool tares, heavy	3.75-4.00
Wool tares, light	3.50-3.75
Manila rope, No. 1 foreign	6.75-7.00
Manila rope, No. 1 domestic	6.75-7.00
Sisal strings	3.40-3.60
Mixed strings	2.75-3.00

Old Papers

Probably never before has the market for old papers experienced such conditions as have prevailed during the period of the past month. With demand on a broad scale and with available supplies decreased by light collections due to the unfavorable weather and the influenza epidemic, values have climbed at a pace surprising to everyone interested in the commodity. Most grades have sold at levels establishing new records for waste paper prices, and, although the situation has quieted down somewhat during the past few days, there is still a strong tone to values, while the sharp upward movement seems likely to break out again at any time. Old newspaper has shown the greatest proportionate gain in value, and flat folded news has sold at 2 cents per pound at shipping points, while this grade of stock packed for export has realized above 3 cents. The high level of prices can be better understood when one considers that prior to the war prices on standard news print paper in rolls ranged around 2.40 cents a pound delivered at pressrooms. Mixed paper of No. 1 quality has sold at 1.25 cents a pound f. o. b. shipping points,

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NEW YORK

old book stock at 3.25 cents, white blank news cuttings at 3.25 cents, No. 1 hard white shavings at 6 to 6.25 cents and soft white shavings of No. 1 grade at 5 to 5.25 cents. Quotations are:

	New York and Chicago
Hard white shavings, No. 1	6.00-6.25
Hard white shavings, No. 2-3	4.75-5.50
Soft white shavings	5.00-5.25
Colored shavings	2.25-2.50
Heavy book, No. 1	3.00-3.25
Crumpled, No. 1	2.50-2.75
Ledger stock	3.00-3.25
Kraft, No. 1	3.25-3.50
Manilas, No. 1	1.75-2.00
White blank news	3.00-3.25
Overissue news, No. 1	2.10-2.25
Folded news	1.85-2.00
Mill wrappers	1.60-1.80
Box board cuttings	1.40-1.50
Mixed paper, No. 1	1.15-1.25
Common paper	.80- .90

Chemical Pulp

A very firm market, technically and otherwise, prevails for chemical wood pulps. Consumption is heavy, and buyers are operating in the market in steady fashion, and with manufacturers having the bulk of their output for some time foresold and therefore offering but limited tonnages to the transient trade, prices are characterized by a strong tone. Demand is not as excited as for some other kinds of paper making material but practically all the pulp offered is readily absorbed and consumers are freely meeting the prices asked. Even kraft pulp, which for a time showed an easy tendency, is moving in larger volume and prices have stiffened, current quotations on this grade of domestic pulp ranging between 3.75 and 4 cents a pound, while sulphite and soda pulp are in persistent call and are selling at gradual advances. Bleached sulphite of extra strong quality is quotable at 6 cents upward at mills, with some producers obtaining 6.25 cents. Unbleached of news print quality is readily fetching 3.50 to 3.75 cents at pulp mills, and easy bleaching sulphite 4.75 to 5 cents, and Mitscherlich sulphite 5.50 to 6 cents. Soda pulp is quoted at 5 to 5.25 cents. Quotations f. o. b. pulp mills follow:

Bleached sulphite	6.00-6.25
Easy bleaching sulphite	4.75-5.00
News grade sulphite	3.50-3.75
Soda pulp, bleached	5.00-5.25
Mitscherlich unbleached	5.50-6.00
Kraft, No. 1	3.75-4.00
Screenings, refined	1.50-1.75

Mechanical Pulp

Available stocks of mechanically ground wood pulp are unusually low and grinders are encountering increasing difficulties in turning out normal tonnages. Weather conditions are decidedly bad, mill streams being frozen over or clogged with anchor ice, and most plants have been obliged to close down some of their machines. Against this situation prevails an active and voluminous demand from news print manufacturers, board mills and other consumers, who are using large quantities of pulp and who are experiencing much trouble in covering their wants. As would be expected with such conditions obtaining, prices are strong and on the uptrend. Freshly ground spruce wood of No. 1 quality is readily selling at as high as $60, while stored pulp finds buyers at $50 and more. Higher prices appear inevitable unless manufacturing conditions soon improve.

Chemicals

Pulp and paper making chemicals are moving into consuming channels in a steady manner and in good volume, while export demand also is active. Quotations in general are firm, and, in most instances, on the ascendancy. Latest prices are:

Alum, lump ammonia	4.00- 4.25
Alum, lump starch	8.25- 8.50
Alum, powdered	4.25- 4.50
Blanc fixe, powdered	4.50- 5.00
Bleaching powder (domestic drums)	2.25- 2.50
Brimstone (ton)	18.00-20.00
Casein	13.00-15.00
Caustic soda, spot delivery	3.60- 3.75
China clay, domestic, washed	11.00-12.00
China clay, foreign	18.00-24.00
Rosin, grade E	18.00-18.25
Satin white	2.25- 2.50
Soda ash, 58 per cent light (bags)	1.90- 2.00
Sulphite of alumina, commercial grade	1.75- 2.00
Starch, Globe, in bags	5.97-
Talc (ton)	16.00-16.50

Blake & Decker, Inc., paper merchants of 501 Fifth avenue, New York, have opened a branch office in the John Hancock Building, 49 Federal street, Boston, Mass., with Harold C. Livermore, formerly with the Dill & Collins Company, in charge.

M. F. Peterson has resigned as secretary of the Cost Association of the Paper Industry, whose offices are at 18 East Forty-first street, New York, to become accountant for the United States Envelope Company in Springfield, Mass. Mr. Peterson has served as secretary of the association since its organization a year or so ago and by faithful and efficient work has built the organization up until it is one of the most important allied bodies of the American Paper and Pulp Association. His resignation was accepted with regrets by the executive committee which adopted resolutions wishing him continued success in his new connections.

PAPER RAGS

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One—4¾" Perforator Head
One—5 " Perforator Head
One—5½" Perforator Head to fit a 90" Toilet Paper Perforator.
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WE ALSO MAKE WAX PAPERS, ALL WEIGHTS, IN SHEETS OR ROLLS

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New Papers

Writing—	
White rag	22-40
White sulphite, No. 1	14-20
Colored	16-25
Ledger—	
White rag	22.44
White sulphite	16-22
Colored sulphite	18-
Colored rag	24-
Bonds—	
White rag	19-50
White sulphite	15-25
Colored sulphite	16-28
Colored rag	19-52
Book—	
No. 1 S. & S. C	10.50-11.00
Machine finished	10.00-10.50
English finished	11.00-13.00
Coated and enamel	12.00-15.00
Lithograph, M. F	10.00-13.00
News Print—	
Rolls, contract	4.00- 4.50
Rolls, transient	8.00-10.00
Sheets	7.00- 8.00
Side runs	6.00- 6.50
Cover Stock—	
Coated, both sides	12.25-
Coated, one side	12.20-
Wrappings—	
No. 1 kraft	9.00- 9.50
No. 2 kraft	8.00- 8.50
Boards—	New York and Chicago
Solid news	75.00-85.00
Straw	60.00-70.00
Plain chip	70.00-75.00
White coated chip	80.00-85.00
Manila coated chip	75.00-80.00
Binders board	80.00-90.00

The Rainbow Paper Mills, of Windsor, Conn., have been sold by the Stanley Works, of New Britain, Conn., to William Catlin, of New York, who has formed a new concern under the title of the Rainbow Paper Corporation with a capital of $100,000 to improve and operate the mills. The property includes two mills, which have been under lease for some months to F. B. Oldham, of East Hartford, Conn.

News Personals

The dates for the annual meeting and banquet of the American Paper and Pulp Association at the Waldorf-Astoria Hotel, New York, have been definitely set for April 12 to 15, inclusive. The first three days will be devoted to divisional meetings, and the general meeting and dinner will be on the 15th.

At the annual meeting of the stockholders of the Kalbfleisch Corporation, held January 21 at the offices of the corporation at 31 Union Square West, New York, the following directors were elected: Franklin H. Kalbfleisch, A. B. Savage, Harry L. Derby, R. C. Clemens and Richard Sheldrick. At the directors' meeting which followed these officers were chosen for the ensuing year: Franklin H. Kalbfleisch, president; A. B. Savage, vice president and treasurer; Harry L. Derby, vice president; Richard Sheldrick, secretary, and A. B. Kalbfleisch, assistant secretary.

The firm of A. Salomon, Inc., of 15 Park Row, New York, dealers in and importers of papermakers' supplies, has increased its capital stock from $10,000 to $200,000.

The Waxed Products Company, of Brooklyn, N. Y., has been organized and incorporated under New York State laws with a capital of $40,000 to make waxed paper and products. J. Hopkins, H. O. Parsons and E. N. A. Gould, of Brooklyn, were the incorporators.

The Gilbert Paper Company, of Menasha, Wisconsin, has ordered of Rice, Barton and Fales Machine Company, at Worcester, Mass., a 120-inch machine for the manufacture of writing papers. The Gilbert Company will soon have finished one of the finest boiler plants among any of the paper mills in America, after which the old power house will be removed, and where this now stands a new machine will be installed. The machine will be delivered in March of next year.

Mr. L. M. Alexander, president of the Nikoosa-Edwards Paper Company, Port Edwards, Wis., recently fell on the ice and suffered a severe sprain of his right arm, which will necessitate keeping his arm in splints for some weeks.

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Our Organization: Ten selling offices, besides salaried travellers and local representatives.
Our Demand: An established clientele, constantly being increased, by an aggressive sales policy.
Our Supply: Your Mill?
Present conditions in America are temporary.
Have you considered what a first-class export outlet would mean to you, with its assurance of steady demand?

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Chemical Pulp

This is the time of the year when arrivals of Scandinavian wood pulp in the United States are at a minimum, owing to closed navigation over the Baltic Sea, and activity in the market here therefore is of limited scope. Such supplies of Swedish or Norwegian pulps as become available, however, find a ready sale among paper manufacturers, who quickly absorb offerings without stopping to argue over the prices asked. Every indication seems to point to a maintenance of quotations on at least prevailing levels for some months. Advices from abroad tell of a very firm condition in the markets there and of Scandinavian manufacturers encountering a greater demand for their pulp than they are able to fill. Quotations importers in New York have recently received on first open water shipments are in most cases above present ruling prices, and sellers on the other side do not appear particularly anxious about securing American business. Receipts at New York in January and current quotations follow:

Bleached sulphite	$7.00-7.50
Unbleached sulphite, No. 1	4.75-5.25
Easy bleaching	6.00-6.25
Mitscherlich unbleached	5.50-5.75
Kraft	4.00-4.25

J. Andersen & Co., 3,250 bls. from Christiania, 1,020 bls. from Copenhagen; M. Gottesman & Co., 4,950 bls. from Orrviken; American Woodpulp Corp., 14,225 bls. from Orrviken, 1,200 bls. from Copenhagen; A. J. Pagel & Co., 1,020 bls. from Orrviken, 2,700 bls. from Copenhagen; Citizens National Bank, 500 bls. from Gothenburg; National Bank of Commerce, 2,750 bls. from Copenhagen; Scandinavian-American Trading Co., 255 bls. from Copenhagen; E. M. Sergeant & Co., 700 bls. from Copenhagen; Tidewater Paper Mills Co., 15,974 bls. ground wood from Liverpool, N. S.; Order, 4,521 bls. from Lynashamn, Sweden. At Philadelphia—Lagerloef Trading Co., 14,269 bls. from Finland.

Paper Stock

Importations of foreign papermaking rags continue fairly voluminous and consumers are reported absorbing supplies freely. The bulk of rags received have their origin in France and Holland, but shipments from Germany are on the increase, while occasional lots from Italy, Spain and England also are coming in. Advices from the other side say that some of the markets there are being swept pretty clean of available stocks; that is, as regards sorted rags. Mixed rags are said to be in plentiful supply, but labor is scarce to grade material. Imports of old rope and bagging are fairly large. Arrivals at New York during January follow:

Old Rope

Old Colony Trust Co., 91 bls. from Antwerp, 107 coils from Hull; Brown Bros. & Co., 13 bls. and 262 coils from Hull, 281 coils from Christiania, 282 coils from Bristol; E. J. Keller Co., 48 bls. from Hull; International Purchasing Co., 232 coils from Hull, 219 bls. from Rotterdam, 91 bls. from Havre; Wilkinson Bros. & Co., 9 coils from Hull; Bemis Bro. Bag Co., 218 coils from Bristol; Maurice O'Meara Co., 75 bls. from Copenhagen; Equitable Trust Co., 191 coils and 110 bls. from Marseilles, 184 bls. from Hull; United Fruit Co., 9 bls. from Cristobal; Order, 85 coils from Glasgow.

Old Bagging

Citizens National Bank, 233 bls. from Hull; Credit Comm'l de France, 53 bls. from Antwerp; R. Goldstein & Son, 147 bls. from Rotterdam; W. Schall & Co., 170 bls. from London; Mann & Cook, 147 bls. from Liverpool; Standard Bank of South Africa, 100 bls. from Dundee, 101 bls. from Leith; Irving National Bank, 148 bls. from Leith; S. Silberman & Co., 100 bls. from Rotterdam; Brown Bros. & Co., 279 bls. from Antwerp; Order, 293 bls. from Bristol, 91 bls. from Antwerp.

Rags

Certain-Teed Products Corp., 1,384 bls. from Antwerp, 307 bls. from Havre; Patent Vulcanite Roofing Co., 178 bls. from Rotterdam, 11 bls. from Antwerp; Edwin Butterworth & Co., 187 bls. from Antwerp; Bartley Mfg. Co., 69 bls. from Rotterdam; I. Kaufman & Sons, 91 bls. from Rotterdam; A. Salomon, 354 bls. from Havre, 448 bls. from Antwerp; W. Schall & Co., 109 bls. from Havre, 238 bls. from London, 50 bls. from Antwerp, 114 bls. from Leith, 379 bls. from Rouen; A. Katzenstein, 127 bls. from Antwerp; E. J. Keller Co., 88 bls. from Hull, 79 bls. from Rotterdam, 72 bls. from Lisbon; Wilkinson Bros. & Co., 358 bls. from Hull; Salomon Bros. & Co., 39 bls. from Hull; Albion Trading Co., 193 bls. from London; Northern Metal Selling Co., 38 bls. from Rotterdam; Maurice O'Meara Co., 112 bls. from Rotterdam; George W. Millar & Co., 98 bls. from Rotterdam; R. Goldstein & Son, 10 bls. from Antwerp; Standard Bank of South Africa, 158 bls. from Glasgow; Equitable Trust Co., 217 bls. from Antwerp, 705 bls. from Havre, 5 bls. from Hull, 90 bls. from Rouen; Foreign Trade Banking Corp., 247 bls. from Antwerp;

Goldman, Sachs & Co., 252 bls. from Antwerp; National City Bank, 34 bls. from Hull, 233 bls. from Havre, 91 bls. from Rouen, 1,253 bls. from Antwerp; British Bank of South Africa, 407 bls. from Liverpool; East River National Bank, 67 bls. from London; Guaranty Trust Co., 18 bls. from Rotterdam; New Netherlands Bank, 315 bls. from Havre; Kidder, Peabody & Co., 88 bls. from Havre, 74 bls. from Antwerp, 239 bls. from Rouen; R. F. Downing & Co., 586 bls. from Rotterdam, 29 bls. from Leith, 473 bls. from Antwerp; Brown Bros. & Co., 1,016 bls. from Antwerp; Davies, Turner & Co., 677 bls. from Antwerp; Citizens National Bank, 120 bls. from Antwerp, 233 bls. from Hull; Order, 860 bls. from Havre, 156 bls. from Hull, 900 bls. from London, 564 bls. from Rouen, 494 bls. from Antwerp.

Miscellaneous Paper Stock

Salomon Bros. & Co., 390 bls. from Rotterdam, 28 bls. from Dundee, 143 bls. from Hull; F. Smith & Co., 15 bls. from Rotterdam; Dallas Waste Mills, 456 bls. from Rotterdam; Atterbury Bros., 52 bls. from Rotterdam; Castle, Gottheil & Overton, 522 bls. from Rotterdam; R. F. Downing & Co., 193 bls. from Rotterdam; I. Kaufman & Sons, 8 bls. from Rotterdam; E. J. Keller Co., 100 bls. from Lisbon, 182 bls. from Dundee, 32 bls. from Hull; S. Ruben's Sons, 35 bls. from Rotterdam; Maurice O'Meara Co., 216 bls. from Marseilles, 41 bls. from Antwerp, 106 bls. from Dundee, 206 bls. from Rotterdam; Ladenburg, Thalman & Co., 56 bls. from Antwerp; Equitable Trust Co., 105 bls. from Antwerp, 73 bls. from Dundee, 77 bls. from Hull, 103 bls. from Glasgow; Guaranty Trust Co., 90 bls. from Antwerp; L. H. Abenheimer, 9 bls. from Antwerp; British Bank of South America, 99 bls. from Manchester; Mechanics & Metals National Bank, 56 bls. from Manchester; International Banking Corp., 22 bls. from Manchester, 212 bls. from Hull, 93 bls. from Glasgow; Irving National Bank, 33 bls. from Manchester, 481 bls. from Glasgow; New Haven & Hartford Railroad, 11 bls. from Dundee; Edwin Butterworth & Co., 110 bls. from Dundee; George W. Millar & Co., 28 bls. from Dundee; Wilkinson Bros. & Co., 156 bls. from Hull; S. Ruhe & Bro., 37 bls. from Rotterdam; W. Van Doorn, 438 bls. from Rotterdam; Brown Bros. & Co., 283 bls. from Glasgow; Foreign Trade Banking Corp., 46 bls. from Glasgow; Standard Bank of South Africa, 195 bls. from Glasgow; Parsons & Whittemore, 90 bls. from Glasgow; Order, 1,999 bls. from Antwerp, 29 bls. from Manchester.

Paper

Importations of cigarette paper from France are fairly large, and occasional consignments of hanging, filter, printing and other foreign papers are being received. Imports at best, however, are considerably below our pre-war receipts of paper from foreign sources. Arrivals at New York in January follow:

Cigarette

British-American Tobacco Co., 80 bls. from Bristol; Guaranty Trust Co., 89 cs. from Havre; Rose & Frank Co., 34 cs. from Havre; American Tobacco Co., 392 cs. from Havre; Wilkinson Bros. & Co., 15 cs. from Havre; H. Lips, 80 cs. from Havre; A. Behan, 10 cs. from Havre; P. J. Schweitzer, 1 cse. from Havre; C. Drucklieb, 15 cs. from Havre; Southern Pacific Co., 5 cs. from Havre.

Hanging

A. E. Buckley, 9 cs. from Liverpool; W. H. S. Lloyd & Co., 93 pkgs. from London, 39 bls. from Liverpool; R. F. Lang, 50 pkgs. from London; Prager Co., 38 cs. from Antwerp; F. J. Emmerich & Co., 11 bls. from Havre; A. C. Dodman, 82 bls. from Liverpool.

Filter

Lunham & Moore, 7 cs. from London; Dinkeisen & Co., 12 bls. from Hamburg; Scientific Material Co., 1 cse. from London; P. H. Petry & Co., 17 cs. from Gothenburg, 2 cs. from London.

Printing

B. F. Drakenfeld & Co., 81 cs. from Liverpool; Lunham & Moore, 1 cse. from London; Japan Paper Co., 1 cse. from London; E. Dietzgen & Co., 17 cs. from Hamburg.

Drawing

Lunham & Moore, 4 cs. from London; Heuffel & Esser Co., 4 cs. from Antwerp.

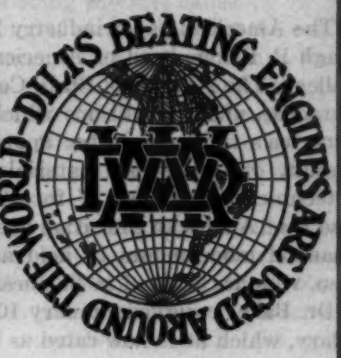
Tissue

R. Hoe & Co., 3 bls. from London.

Miscellaneous

Mansell, Hunt, Catty Co., 2 cs. from London; E. Dietzgen & Co., 2 cs. from London, 8 cs. from Rotterdam, 269 cs. from Hamburg; R. H. Macy & Co., 5 cs. from Havre; Hammel & Riglander, 5 cs. from Hamburg; National City Bank, 97 cs. from Hamburg; F. E. Vinshall, 40 cs. from London; Newark Paraffine & Parchment Co., 78 cs. from Hamburg; Rose & Frank Co., 8 cs. from Antwerp; A. P. Meyer, 3 cs. from Antwerp; British-American Tobacco Co., 78 bls. from Bristol; Shapirograph Co., 20 bls. from Hamburg; Continental Transit Co., 2 cs. from Havre; Lampert & Sons, 2 cs. from Havre; J. J. Gavin & Co., 3 cs. from Liverpool; L. S. Dixon & Co., 7 cs. from Liverpool; Favor, Ruhl & Co., 5 cs. from Havre; Whiting & Cook, 5 bls. from Gothenburg; Hart Trading Co., 9 bls. from Gothenburg; Lunham & Moore, 64 pkgs. from London; R. S. Rigglis & Co., 5 cs. from London; J. H. & G. B. Siebold, 25 cs. from Canton; Sutherland International Dispatch, 2 cs. from Liverpool; Atlantic Forwarding Co., 2 cs. from Havre; F. Caliste, 4 cs. from Havre; Order, 50 bls. from Copenhagen, 9 cs. from London.

Mr. A. S. Winter, formerly connected as advertising and sales manager for The Wm. Powell Co., has joined the sales force of The Fairbanks Co., Pittsburgh, Pa., and will represent them in Southern Ohio.



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Manufacturers of

Beating and Washing Engines, Fly Bars, Bed Plates,
Rag, Chipper and Cutter Knives, etc.

The Demand for Maximum Production

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Hugh P. Baker Becomes Secretary of American Paper and Pulp Ass'n

The American paper industry has taken over Dean Hugh P. Baker, head of America's biggest Forestry College, The New York State College of Forestry at Syracuse, under conditions which indicate both that America's timber industry appreciates the need for a study of future raw materials, and for men with a technical knowledge of forestry in industry, and also that American education does not offer sufficient financial inducements to hold as college presidents men, who are wanted in business.

Dr. Baker resigned January 10 to accept twice the salary, which he is now rated as receiving, to become secretary-treasurer of the American Paper and Pulp Association, with headquarters at New York. He takes up his new work probably about March 1.

The plan of the American Paper and Pulp Association in offering this position to Dean Baker is disclosed in the following letter from President George W. Sisson, Jr.

"The American Paper and Pulp Association finds itself in need of a man of ability, education and breadth of view, to act as its secretary, and carry out the policies of the association, and generally direct its activities in co-operation with its president and executive committee.

"The members of this association have come to realize the importance and necessity of broadening the work of the Association by studying the problems that affect the industry nationally, including, of course, among others, the vital question of the future raw material supply for this great industry on which the business and social life of the nation depend for an indispensable article. I believe there is a great work to do through the association, and a fine opportunity for genuine public service in making it effective in its own field.

"In casting about for a man who could take up the work with every prospect of successful service to the industry and the country, we have come to feel that you present in many ways the type of man needed, and our committee having the matter in charge has authorized me to offer the position to you."

In Dean Baker's letter of resignation, he gives a striking outline of American forestry development and says in part: "After giving this whole matter as careful consideration as I have ever given any matter which has come up in my life, I am convinced that my acceptance of the place will mean a great deal to the profession of forestry in America, and that it will be an opportunity to take forestry to one of the greatest industries in the country dependent upon our forests."

A commercial agent from Argentina is now in the United States and desires to secure agencies for the sale in the River Plate countries of paper and paper goods. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 31718.

A manufacturer in Spain desires to secure an agency for the sale of paper and cardboard. Correspondence should be in Spanish. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 31697.

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Hand or motor operated.
Send for catalog.

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Signode straps insure delivery of framed paper bundles in the same condition they leave the mill. Cheaper than rope. No battered corners. Liberal trial arrangement.

Write for Particulars and Prices

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H. O. NUMAN

Barking Drums

Green Bay, Wis.

Will Build Paper Machines

The Valley Iron Works, of Appleton, Wisconsin, is putting up two more large additional buildings to their plant, one of which will be to double up the size of their present foundry, and the other for a second large erecting department. This firm has entered the field of paper machinery builders. While for many years the Valley Iron Works has manufactured beating engines and several other kinds of paper mill machinery, they never heretofore made paper machines, but have on hand at the present time orders for two 88-inch five-cylinder machines for the H. W. Johns-Manville Company. One of these machines is to go to this company's plant at Manville, R. I., and the other one is to go to the new mill to be built by this company, north of Waukegan, Illinois. As soon as these machines are built, the Valley Company will then rebuild several of the present machines for the Johns-Manville Company.

At the annual meeting of the stockholders of the Wausau Sulphate Fibre Co., held Thursday, January 22nd, the following gentlemen were elected as members of the Board of Directors to succeed themselves: O. Bache-Wiig, Louis Dessert, M. C. Ewing, G. D. Jones, A. L. Kreutzer, Karl Mathie, John F. Ross, F. P. Stone, H. M. Thompson, which Board subsequently met, organized and elected the following officers to succeed themselves for the ensuing year: F. P. Stone, president; O. Bache-Wiig, vice-president and general manager; Louis Dessert, vice-president; A. L. Kreutzer, treasurer; G. D. Jones, secretary; J. P. Sill, assistant secretary-treasurer; Karl Mathie, chairman of the board.

At the annual meeting of stockholders, the recommendation of the board was approved, to increase the capital stock from $3,000,000 to $3,500,000, the increase being $500,000 in preferred stock, which is in effect authorizing additional funds to the extent of about $850,000, as the present authorized $500,000 preferred stock has all been retired except about $150,000.

The company is acquiring about 50,000 acres of timberlands, and is planning the further development of its water power as well as extensions to plant.

Mr. J. M. Allen has been elected secretary-treasurer of the Cost Association of the Paper Industry, to succeed M. F. Peterson, who recently resigned to go with the United States Envelope Company. Mr. Allen has had considerable experience in this work, among which was cost work, investigations, and the like for the Ordnance Department of the U. S. Army.

The receivership involving The Miami Valley Tissue Mills Company was set aside on Tuesday, January 13th, in Court of Common Pleas of Warren County, Judge Wright presiding. Evidence failed to show cause why said receiver should have been appointed or why he should be continued. The finances of the company were not involved, dissension among the board of directors being the sole cause.

At the annual meeting of stockholders of the company on Monday, January 12th, a new board was created, who in turn re-elected Walter J. Meyer, president, and E. E. Conroy, secretary. Immediately following the court's decision the plant resumed operations and is now working to full capacity.

The firm of F. G. Marquardt, Inc., dealers in paper and paper mill supplies, has moved its offices from 345 Broadway to 120 West Thirty-second street, New York, and has issued invitations to paper manufacturers and paper mill executives to utilize the new offices for appointments, conferences, etc., when in the Eastern metropolis. The new location is within a stone's throw of the Pennsylvania Railroad terminal, subway and elevated lines and many of New York's leading hostelries, and should prove a convenient meeting place for visiting paper men.

Death of O. C. Barber

Funeral services were held on February 7, at Anna Dean Farm, Barberton, Ohio, for O. C. Barber. Mr. Barber was for many years one of the best known figures in America in the boxboard business, having been president of the American Straw Board Company for many years up to the time of his death, and was possibly the most prominent figure in America in this branch of the paper industry.

Mr. J. E. Heiskanew, who for some time was chief engineer of the Champion Fiber Co., Canton, N. C., and recently construction engineer with the Management Engineering & Development Co., Dayton, O., has resigned the latter position, and has accepted the position as chief engineer in charge of pulp and paper mill department of Kone-ja Siltarakemus O. Y., Helsingfors, Finland.

The Gibbs-Brower Company, paper and pulp mill brokers, of 261 Broadway, New York City, have sold for the Nixon and Costello Company, of 23 Sears Street, Dayton, Ohio, their Whitehall mill located at Whitehall, Md. Mr. M. B. Costello, secretary, who had charge of the sale of the mill, states that his company took the property over about four years ago. They put the entire property, buildings, dams, machinery, etc., in excellent condition, spending considerable money on the plant. They have very successfully and economically made light weight chip board and bogus wrapping for their own use. For various reasons, we are not in a position to mention the name of the purchaser of this property, but let us suffice it to say that New York City has acquired one more claim on the Old Line State.

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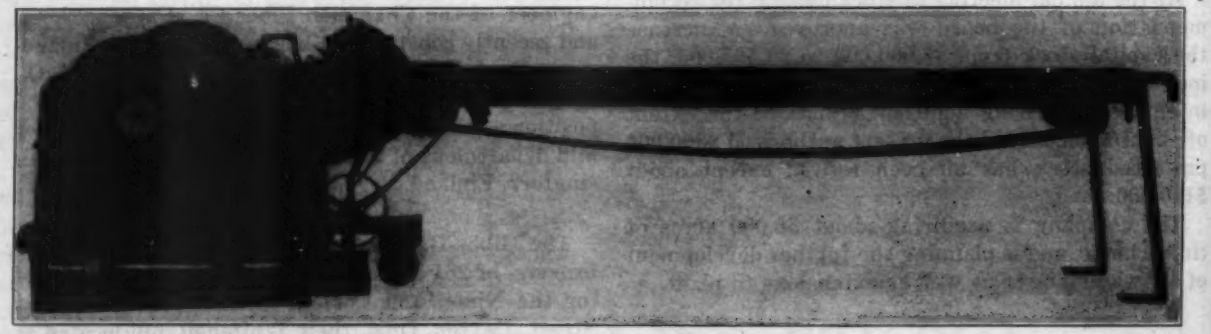

Capacity 2½ Tons Per Hour
Especially Adapted for Handling Waste Paper, Magazines, Etc., Before Feeding to the Beaters

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Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ADHESIVES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

ACID RESISTING BRONZE
Sandusky Foundry & Machine Co., Sandusky, Ohio.
William A. Hardy & Sons, Fitchburg, Mass.

AGITATOR EQUIPMENT
The Hill Clutch Co., Cleveland, Ohio.
Moore & White Co., Philadelphia, Pa.

AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

ANGLE VALES
The Crane Company, Chicago, Ill.

ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.

ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.

ASH CONVEYOR SYSTEMS
American Steam Conveyor Corp., Chicago, Ill.

BALING PRESSES
Ohio Cultivator Co., Belleville, O.

BARKERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

BARKING DRUMS
H. O. Numan, Green Bay, Wis.

BEATER BARS
John W. Bolton & Sons, Inc., Lawrence, Mass.
R. J. Dowd Knife Works, Beloit, Wis.
Simonds Manufacturing Co., Fitchburg, Mass.

BEATER BED PLATES
John W. Bolton & Sons, Inc., Lawrence, Mass.
R. J. Dowd Knife Works, Beloit, Wis.
Simonds Manufacturing Co., Fitchburg, Mass.

BEATER ROLL FILLING
John W. Bolton & Sons, Inc., Lawrence, Mass.
R. J. Dowd Knife Works, Beloit, Wis.
Simonds Manufacturing Co., Fitchburg, Mass.

BEATING, WASHING AND BLEACHING ENGINES
Beloit Iron Works, Beloit, Wis.
Dayton Beater & Hoist Co., Dayton, Ohio.
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

BEATERS (Continuous)
Claflin Engineering Co., Lancaster, Ohio.
The Griley-Unkle Eng. Co., Ft. Wayne, Ind.
Bird Machine Co., East Walpole, Mass.

BELTING (Rubber)
United States Rubber Co., New York and Chicago

BELT DRIVES
The Hill Clutch Co., Cleveland, Ohio.
The Link Belt Co., Chicago, Ill.

BLEACHING (Propellers)
Moore and White Co., Philadelphia, Pa.

BLANKETS
Frank F. Alt, 421 Columbia St., La Fayette, Ind.

BLOWERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

BOARD MACHINES
Beloit Iron Works, Beloit, Wis.
Valley Iron Works, Appleton, Wis.

BOARDS (Straw)
The C. L. La Boiteaux Co., Cincinnati, O.

BOILER FEEDER
The Farnsworth Co., Conshohocken, Pa.

BOILER SETTINGS
McLeod & Henry Co., Troy, N. Y.

BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.

BROKERS & FORWARDING AGENTS
Premier Shipping Co., 32 Broadway, N. Y. C.

BRIMSTONE
Union Sulphur Co., 17 Battery Place, New York City.

BRONZE JACKETS
Sandusky Foundry & Machine Co., Sandusky, Ohio.

BUNDLING SYSTEMS
Signode System, Lake St., Chicago

CALENDERS
Beloit Iron Works, Beloit, Wis.
Holyoke Machine Co., Holyoke, Mass.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N.Y.

CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.
B. F. Perkins and Son, Inc., Holyoke, Mass.

CASEIN
The Kalbfleisch Corp., 31 Union Square, N. Y. C.

CAST IRON PIPE
U. S. Cast Iron Mfg. Co., Pittsburgh, Pa.
Cast Iron Publicity Bureau, New York City.

CENTRIFUGAL PUMPS
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Valley Iron Works Co., Appleton, Wis.

CHEMICALS
The Grasselli Chemical Co., Cleveland, Ohio.
A. Klipstein & Co., 644 to 652 Greenwich St., New York City.

CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

CHIPPER AND BARKER KNIVES
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.
R. J. Dowd Knife Works, Beloit, Wis.

CLAYS AND FILLERS
Binney & Smith Co., 81 Fulton St., N. Y. C.
Daniel M. Hicks, 140 Nassau St., New York City.
The John W. Higman Co., Inc., 29 Broadway, New York City.
Miner-Edgar Co., 30 Church St., New York City.
International Pulp Co., 41 Park Row, N. Y. C.

COAL BUNKERS
The Brownhoist Co., Cleveland, Ohio.

COATED PAPERS
Bardeen Paper Co., Otsego, Mich.
Bermingham & Prosser, Chicago, Ill.
Bryant Paper Co., Kalamazoo, Mich.
Monarch Paper Co., Kalamazoo, Mich.
Rex Paper Co., Kalamazoo, Mich.
Seaman Paper Co., Chicago, Ill.
Watervliet Paper Co., Watervliet, Mich.

CRANES
The Brownhoist Co., Cleveland, Ohio.
John F. Byers Co., Ravenna, Ohio.
Northern Engineering Works, Detroit, Mich.
The Chisholm-Moore Mfg. Co., Cleveland, O.
The Link Belt Co., Chicago, Ill.

CONSTRUCTION (Building)
The Aladdin Co., Bay City, Mich.

CONSULTING ENGINEERS
James L. Carey, 208 N. Laramie St., Chicago, Ill.
Hardy S. Furguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.

CONSULTING ENGINEERS (Power)
J. F. Carrigan Engineering Co., 504 Cunard Bldg., Chicago.

CONVEYORS
Portable Machine Co., Passaic, N. J.

CYLINDER MOLDS
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
The Lindsay Wire Weaving Co., Cleveland, O.
W. S. Tyler Co., Cleveland, Ohio.

DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Ohio.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.

DECKEL FRAME SUPPORTS
Huband and Nash, Menasha, Wis.

DRUM WINDERS
Ticonderoga Machine Co., Ticonderoga, N. Y.

DRYER FELTS
Albany Felt Co., Albany, N. Y.
Appleton Woolen Co., Appleton, Wis.
F. C. Huyck & Sons.
Shuler and Benninghofen, Hamilton, Ohio.

DYESTUFFS
Binney & Smith, 81-83 Fulton St., N. Y. City.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
Grasselli Chemical Co., Cleveland, Ohio.
A. Klipstein & Co., 644 to 652 Greenwich St., New York City.

DUST COLLECTING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

ELEVATORS (Portable)
Economy Engineering Co., Chicago, Ill.
Lakewood Mfg. Co., The, Cleveland, Ohio.

ELECTRIC FANS
B. F. Perkins and Sons, Inc., Holyoke, Mass.

ELECTRIC HOISTS
John F. Byers Machine Co., Ravenna, Ohio.
Northern Engineering Co., Detroit, Mich.

Special Paper Mill Filters

We are now building a new line of filters specially suitable for **Pulp** and **Paper Mills**, which produce the results you want. This

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is built of **Concrete** and **Wrought Iron Pipe** with Brass Strainers and heavy Brass Laterals for the air wash system. It will not only give you the best service, but **can be sold for considerable less than any Filter on the market.**

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Pennsylvania Bldg., Philadelphia, Pa.

The "SIMS" Open Feed WATER HEATER, FILTER & PURIFIER

WHEN you buy a water heater, or anything else for that matter, you do not actually buy a water heater, but what it will do.

"SIMS" Open Feed Water Heater, Filter and Purifier is the product of Modern Engineering Science and has met the demand for greater efficiency.

OPEN FEED construction is the most simple and effective principle of feed water heating and has less maintenance troubles and operating costs than any other type.

WATER HEATER feeds your boilers with hot water, reduces the strain from contraction and expansion due to feeding cold water and effects a saving of approximately 14.5% in fuel.

FILTER the feed water in a filtering chamber containing hard coke of suitable size as the filtering medium.

and PURIFIER Water containing earthy matter and carbonate of lime when heated close to the boiling point is thrown out of solution into suspension and is removed by the filter.

Is installed you GET the service you bought

Ask us about the "Sims" feed-water heaters.

THE SIMS COMPANY

"We Keep Others in Hot Water."

ERIE **PENNA.**

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ELEVATING TRUCKS
Economy Engineering Co., Chicago, Ill.
Lakewood Engineering Co., Cleveland, O.
Moore and White, Philadelphia, Pa.

ENGINES
Ball Engine Co., Erie, Pa.
The Brownell Co., Dayton, O.
Chandler and Taylor, Indianapolis, Ind.
Erie Engine Works, Erie, Pa.
Hooven, Owens, Rentschler Co., Hamilton, Ohio.

ENGINEERS
James L. Carey, 208 North Laramie St., Chicago Ill.
George F. Hardy, 309 Brodway, New York City.
Hardy S. Ferguson, 200 Fifth Ave., New York City.

EVAPORATORS:
Buffalo Foundry & Machine Co., Buffalo, N. Y.
Swenson Evaporator Co., Chicago, Ill.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

FASTENERS (Screen Plate)
Union Screen Plate Co., Fitchburg, Mass.

FELTS AND JACKETS
Appleton Woolen Co., Appleton, Wis.
F. C. Huyck & Sons, Albany, N. Y.
Shuler and Benninghofen, Hamilton, Ohio.
Albany Felt Co., Albany, N. Y.

FELT AND WIRE GUIDES
Huband and Nash, Menasha, Wis.
Moore & White Co., Philadelphia, Pa.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.

FILTERS (Pressure and Gravity)
Graver Corporation, East Chicago, Ind.
Hungerford & Terry, Philadelphia, Pa.

FILTER (Continuous Suction)
Green Bay Foundry & Machine Co., Green Bay, Wis.

FRICTION CLUTCHES
The Hill Clutch Co., Cleveland, Ohio.
Moore and White Co., Philadelphia, Pa.

FIRE BRICK
Oliver Bros., 97 Warren St., New York City.

FURNACE ARCHES
McLeod & Henry Co., Troy, N. Y.

FUSES
Economy Fuse & Mfg. Co., Kinzie and Orleans Sts., Chicago, Ill.

GAS MASKS
National Appliance Co., Elgin, Ill.

GEARS
The Hill Clutch Co., Cleveland, Ohio.

GLUES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

GRINDERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works, Appleton, Wis.

HAND STOKERS
The Carrigan Engineering Co., Cunard Bldg., Chicago.
The Files Eng. Co., Inc., Providence, R. I.

HEATERS (Feed Water)
Graver Corporation, East Chicago, Ind.
The Sims Co., Erie, Pa.

HOISTING AND CONVEYING SYSTEMS
John F. Byers Machine Co., Ravenna, Ohio.
Northern Engineering Co., Detroit, Mich.
The Chisholm-Moore Mfg. Co., Cleveland, Ohio.

HOSE
United States Rubber Co., Chicago, Ill.

HYDRAULIC TURBINES
Holyoke Machine Co., Holyoke, Mass.
James Leffel and Co., Springfield, Ohio.
S. Morgan Smith Co., York, Pa.

INDUSTRIAL HOUSES
The Aladdin Co., Bay City, Mich.

JORDAN FILLINGS
J. W. Bolton & Sons, Inc., Lawrence, Mass.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Valley Iron Works Co., Appleton, Wis.

KNIVES
E. C. Atkins & Co., Indianapolis, Ind.
John W. Bolton & Sons, Inc., Lawrence, Mass.
R. J. Dowd Knife Works, Beloit, Wis.
Simonds Manufacturing Co., Fitchburg, Mass.

LAYBOYS
Moore and White Co., Philadelphia, Pa.

LIFT TRUCKS
Economy Engineering Co., Chicago, Ill.
Lakewood Eng. Co., The, Cleveland, O.
Lewis Shepard Mfg. Co., Chicago, Ill.
Stuebing Truck Co., Cincinnati, O.

KNIFE GRINDING MACHINERY
Machinery Co. of America, Big Rapids, Mich.

LIGHTING EQUIPMENT
Benjamin Electric Co., Chicago, Ill.

LINE SHAFT BEARINGS
The Hill Clutch Co., Cleveland, Ohio.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.
Valley Iron Works, Appleton, Wis.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

MECHANICAL PULP
J. Andersen & Co., 21 E. 40th St., New York City.
Hart Trading Co., Inc., Tribune Bldg., New York City.
E. B. Thomas & Co., Inc., 100 Hudson St., New York City.

MECHANICAL STOKERS
Sanford Riley Stoker Co., Worcester, Mass.

METERS (Gasoline)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

OIL FILTRATIONS & CIRCULATING SYSTEMS
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

OIL HANDLING AND STORING EQUIPMENT
The Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

PAPER BOARDS
The C. L. La Boiteaux Co., 200 Fifth Ave., N. Y.
F. D. Wilson, 1520 Lumber Exchange Building, Chicago, Ill.

PAPER CUTTERS & SLITTERS
Hamblet Machine Co., Lawrence, Mass.

PAPER DISTRIBUTORS
Bermingham and Prosser, Chicago, Ill.
Seaman Paper Co., Chicago, Ill.

PAPER EXPORTERS AND IMPORTERS
American Transmarine Co., 13 Park Row, New York City.
Gatti-McQuade Co., 200 Fifth Ave., New York City.
Hart Trading Co., Inc., Tribune Bldg., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Main Paper Stock Co., 23-31 Peck Slip, New York City.
New York Overseas Co., 17 Battery Place, New York City.
Storm & Bull, 2 Rector St., New York City.
E. B. Thomas & Co., Inc., 100 Hudson St., New York City.
Interstate Pulp and Paper Co., Grand Central Bldg., New York City.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.
Parsons Trading Co., 17 Battery Place, N. Y. C.

PAPER MACHINES
Beloit Iron Works, Beloit, Wis.

PAPER MANUFACTURERS
American Writing Paper Co., Holyoke, Mass.
Bardeen Paper Co., Otsego, Mich.
Bogalusa Paper Co., Inc., Bogalusa, La.
Bryant Paper Co., Kalamazoo, Mich.
Hammermill Paper Co., Erie, Pa.
Lakeside Paper Co., Neenah, Wis.
Marathon Paper Co., Rothschild, Wis.
Monarch Paper Co., Kalamazoo, Mich.
Munising Paper Co., Munising, Mich.
Nekoosa-Edwards Co., Nekoosa, Wis.
Northern Paper Mills, Green Bay, Wis.
Oxford Paper Co., 200 Fifth Ave., N. Y. City.
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Mosinee, Wis.
Wolverine Paper Co., Otsego, Mich.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., 21 East 40th St., New York City.
Francis Hughes Co., 21st St. and Loomis Ave., Chicago.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Gatti-McQuade Co., 200 Rifth Ave., New York City.
Martin Spinelli, 132 Nassau St., New York City.
Main Paper Stock Co., 23-31 Peck Slip, New York City.
Mendelson Bros. Paper Stock Co., 910 Michigan Ave., Chicago.
New York Overseas Co., Inc., 17 Battery Place, New York City.
Salomon Bros. & Co., 200 Fifth Ave., N. Y. C.
E. B. Thomas & Co., Inc., 100 Hudson St., New York City.
Vito G. Cantasano & Bros., 185 South St., New York City.

PAPER MILL BROKERS
Gibbs-Brower Co., 261 Broadway, N. Y. C.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER AND PULP MILL MACHINERY
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.

PAPER TESTERS
B. F. Perkins and Son, Inc., Holyoke, Mass.
The Widney Co., Chicago, Ill.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Sutherland Paper Co., Kalamazoo, Mich.

RUB-STEEL VALVES

UNIFORM—

IN QUALITY . EFFECT . PRICE

Conceded by Power Plant experts the most practical valve disc, whatever the constructive elements.

BECAUSE

Correctly proportioned in weight and strength.
Incomparably compact in volume.
Unyielding in resistance to applied pressure.
Positive and permanent seating is assured.
Simplest to place.
Longest to stay.

Hailed by intelligent users as the unbeatable valve value. Made on strictly maintained and original formulas. One price to all. Refitting costs eliminated.

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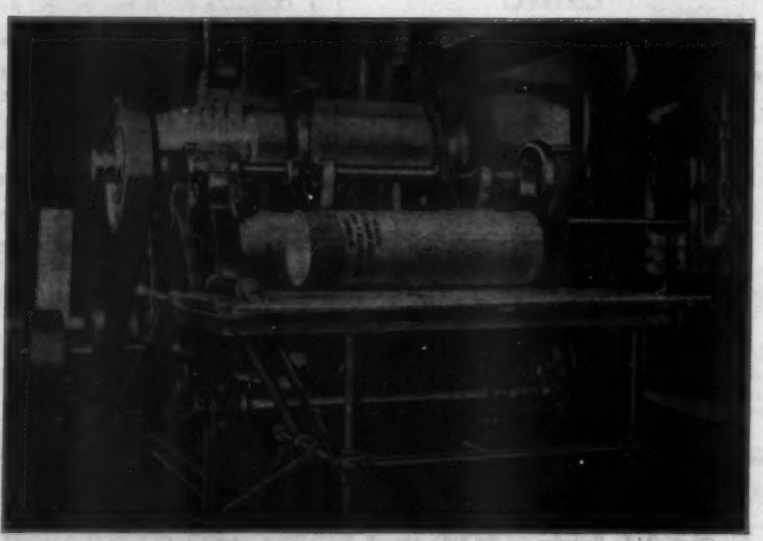
New York Office, 38 Vesey Street

EFFICIENCY IN WRAPPING ROLLS



is only obtainable by the use of the

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Wraps and stencils Rolls at a saving of from fifty to seventy-five per cent.

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Manufacturers and Sole Agents NEKOOSA, WIS., U.S.A.

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

PIPE BENDING
American Pipe Bending Co., Boston, Mass.

PIPING EQUIPMENT
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

POWER TRANSMISSION
F. L. Smidth & Co., 50 Church St., N. Y. C.
The Hill Clutch Co., Cleveland, Ohio.

PULP (Chemical)
American Transmarine Co., 13 Park Row, New York City.
J. Andersen & Co., 21 East 40th St., New York City.
Eastern Manufacturing Co., 501 Fifth Ave., New York City.
Hart Trading Co., Inc., Tribune Bldg., New York City.
Daniel M. Hicks, 140 Nassau St., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
New York Overseas Co., Inc., 17 Battery Place, New York City.
Price & Pierce, Ltd., 30 East 42nd St., New York City.
The Pulp & Paper Trading Co., 21 East 40th St., New York City.
Scandinavian-American Trading Co., 50 East 42d St., New York City.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.
Perkins-Goodwin Co., 33 W. 42nd St., N. Y. C.

PULP (Mechanical)
Perkins-Goodwin Co., 33 W. 42nd St., N. Y. C.

PULP EXTRACTORS
The Griley-Unkle Eng. Co., Ft. Wayne, Ind.

PULP AND PAPER MACHINERY
Beloit Iron Works, Beloit, Wis.
Bird Machine Co., East Walpole, Mass.
Moore & White Co., Philadelphia, Pa.
Valley Iron Works, Appleton, Wis.

PULP WASHERS
The Green Bay Foundry and Machine Co., Green Bay, Wis.

PUMPS (Paper)
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS (Gasoline)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
Buffalo Foundry and Machine Co., Buffalo, N. Y.
Thos. H. Savery, Republic Bldg., Chicago, Ill.
Dean Bros., Indianapolis, Ind.

RAG AND PAPER DUSTERS
Holyoke Machine Co., Holyoke, Mass.

REFLECTORS
Benjamin Electric Co., Chicago, Ill.

RESPIRATORS
National Appliance Co., Elgin, Ill.

ROTARY VACUUM PUMPS
Sandusky Foundry & Machine Co., Sandusky, O.

RUBBER ROLLS
United States Rubber Co., New York and Chicago

ROLL GRINDING
Bevis & Shartle Mch. Co., Middletown, O.

ROLL WRAPPING MACHINES:
Nekoosa Motor & Machine Co., Nekoosa, Wis.

ROTARY SCREEN
Bird Machine Co., East Walpole, Mass.
Thos. H. Savery, Republic Bldg., Chicago, Ill.

SAVE-ALLS
Bird Machine Co., East Walpole, Mass.
The Green Bay Foundry and Machine Co., Green Bay, Wis.

SAWS
Simonds Manufacturing Co., Fitchburg, Mass.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
Union Screen Plate Co., Fitchburg, Mass.
William A. Hardy & Sons, Fitchburg, Mass.

SCREEN DIAPHRAGMS
United States Rubber Co., Chicago, Ill.

SHAKE (Fourdrinier Cushion)
Wm. C. Nash, Neenah, Wis.

SHOWER PIPES
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago, Ill.

SLITTING AND REWINDING MACHINERY
Cameron Machine Co., Brooklyn, N. Y.
Hamblet Machine Co., Lawrence, Mass.

SOOT BLOWERS
Diamond Power Specialty Co., Detroit, Mich.

SPEED CHANGES
Moore and White Co., Philadelphia, Pa.

STEAM JET CONVEYORS
American Steam Conveyor Corp., Chicago, Ill.

STOCK CIRCULATING SYSTEM
Claflin Engineering Co., Lancaster, Ohio.
Ticonderoga Machine Works, Ticonderoga, N.Y.

STOCK PUMPS
Buffalo Steam Pump Co., Buffalo, N. Y.

STOCK SHREDDER
The Green Bay Foundry and Machine Co., Green Bay, Wis.

SUCTION ROLLS
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SULPHUR
Union Sulphur Co., 17 Battery Place, New York City.

SULPHUR BURNERS
Valley Iron Works Co., Appleton, Wis.

TANKS (Oil Storage)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.
Graver Corporation, East Chicago, Ind.

TANKS (Steel)
Graver Corporation, East Chicago, Ind.

TANKS (Welded)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

TANKS (Water Storage)
Graver Corporation, East Chicago, Ind.

TIERING MACHINES
Economy Engineering Co., Chicago, Ill.
Lakewood Mfg. Co., Cleveland, Ohio.

TURBINES (Hydraulic)
James Leffel and Co., Springfield, Ohio.
S. Morgan Smith Co., York, Pa.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVES
The Crane Co., Chicago, Ill.
G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, Ill.
The Wm. Powell Co., Cincinnati, Ohio.
Voorhees Rubber Mfg. Co., Jersey City, N. J.

VALVES (Strainer)
Bird Machine Co., East Walpole, Mass.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VARIABLE SPEED ENGINES
Ball Engine Co., Erie, Pa.
The Brownell Co., Dayton, Ohio.
Chandler and Taylor, Indianapolis, Ind.
Erie Engine Works, Erie, Pa.
Hooven, Owens, Rentschler Co., Hamilton, O.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Perkins and Son, Inc., Holyoke, Mass.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

WASHER WIRES
The W. S. Tyler Co., Cleveland, Ohio.

WASTE PAPER STOCK
Gatti-McQuade Co., 200 Fifth Ave., New York City.
Francis Hughes Co., 21st and Loomis Street, Chicago.
Main Paper Stock Co., 23-31 Peck Slip, New York City.
F. G. Marquardt, Inc., 345 Broadway, N. Y. C.
Martin Spinelli, 132 Nassau St., New York City.
Mendelson Bros. Paper Stock Co., 910 S. Michigan Blvd., Chicago, Ill.
E. B. Thomas & Co., Inc., 100 Hudson St., New York City.
Salomon Bros. & Co., 200 Fifth Ave., N. Y. C.

WATER FILTER
The Green Bay Foundry and Machine Co., Green Bay, Wis.

WATER HEATERS:
Graver Corporation, East Chicago, Ill.
The Sims Co., Erie, Pa.

WATERPROOF LINING
The National Waterproofing Co., Philadelphia, Pa.

WATER-SOFTENING AND PURIFYING SYSTEMS
Graver Corporation, East Chicago, Ind.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
James Leffel and Co., Springfield, Ohio.
Holyoke Machine Co., Holyoke, Mass.
S. Morgan Smith Co., York, Pa.

WET MACHINES
Valley Iron Works Co., Appleton, Wis.

WIRE SIGNS
Cheney Bigelow Wire Works, Springfield, Mass.

WRAPPING MACHINES
Nekoosa Motor and Machine Co., Nekoosa, Wis.

Increased Drying Capacity

The Jennings Hytor Dryer Exhaust Unit improves the circulation of steam in the Dryers and handles air and water efficiently. These units require minimum power, space, maintenance and attention.

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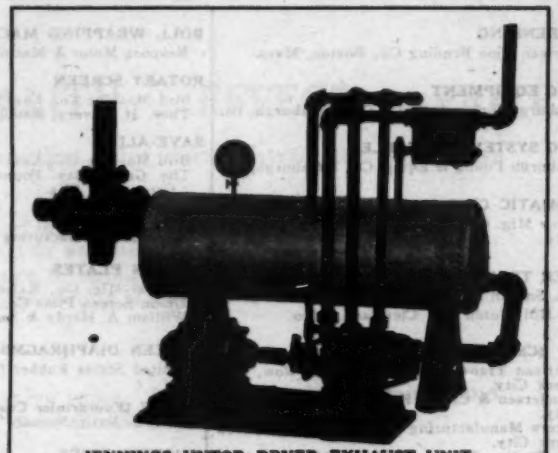


JENNINGS HYTOR DRYER EXHAUST UNIT

THOMAS H. SAVERY, Jr.

1718 Republic Building **CHICAGO, ILLINOIS**

Holyoke Machine Co. HOLYOKE MASS.

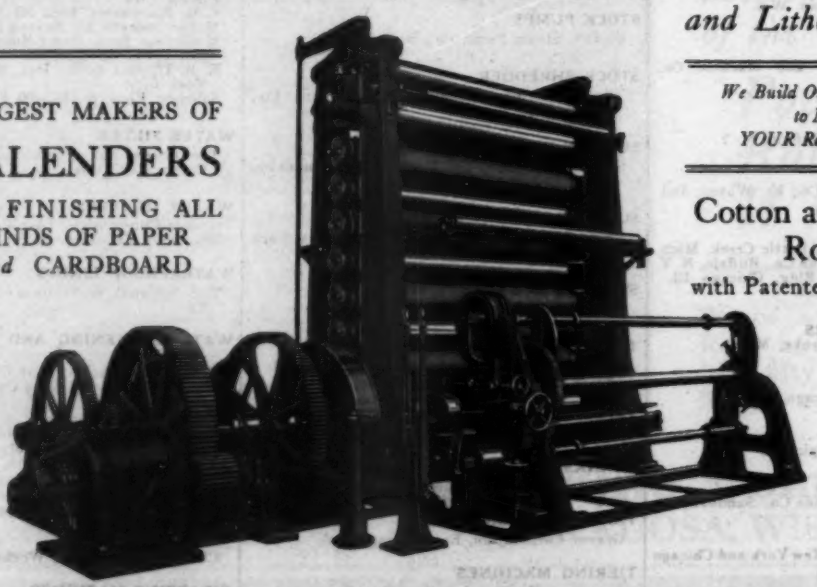
MAKERS OF

Improved Machinery for Wood Pulp, Paper Mills, Paper Converters, Printers and Lithographers.

LARGEST MAKERS OF

CALENDERS

FOR FINISHING ALL KINDS OF PAPER *and* CARDBOARD



We Build Our Machinery to Meet YOUR Requirements

Cotton and Paper Rolls

with Patented Fastenings

Alphabetical Index to Our Advertisers

When writing them, please mention The Paper Industry

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Alt, Frank F., 421 Columbia St., Lafayette, Ind. 1043
American Blower Co., Detroit, Mich. 974
American Pipe Bending Machine Co., Boston, Mass. 1068
American Steam Conveyor Corp., Chicago, Ill. 1032
American Steam Pump Co., Battle Creek, Mich. 1033
American Transmarine Co., Inc., 13 Park Row, N. Y. C. 1042
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Atkins & Co., E. C., Indianapolis, Ind. 1067

Ball Engine Co., Erie, Pa. 1039
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